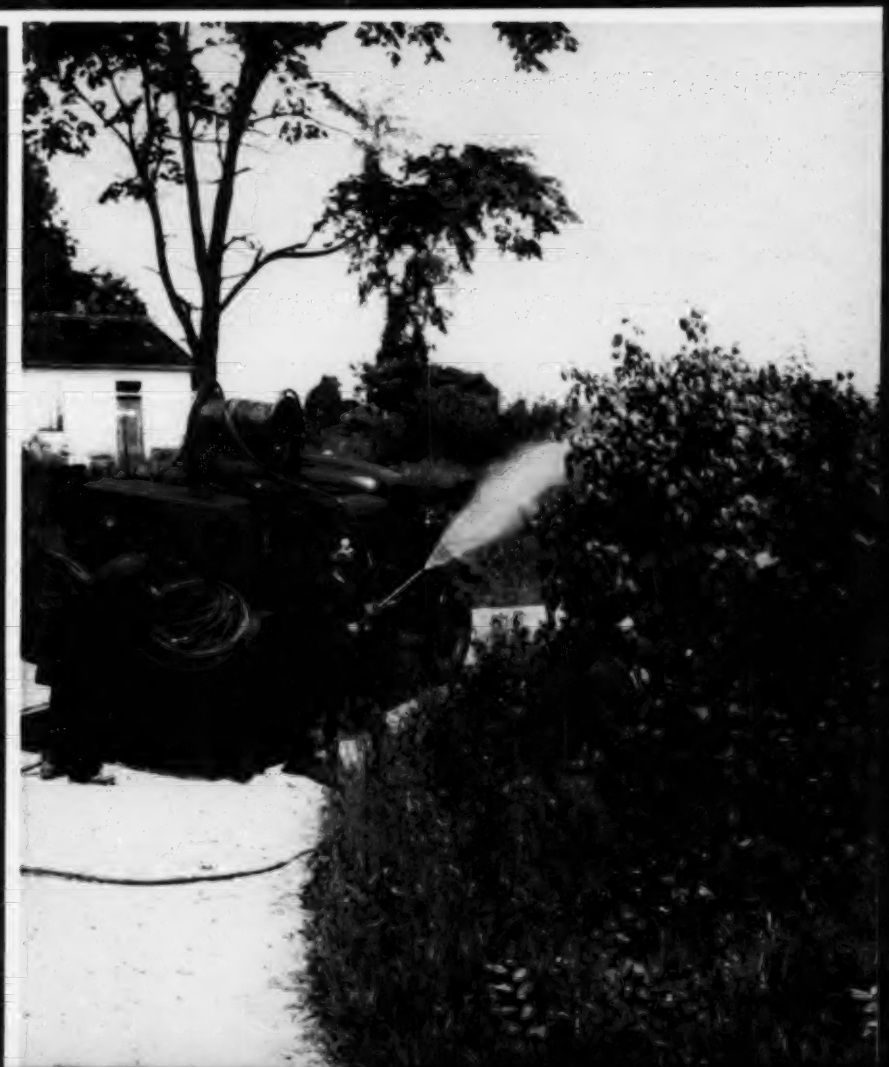
AGRICULTURAL CHEMICALS



Third of a series designed to tell the story of the pesticide industry's leading carrier and diluent.

Why is Attaclay preferred for primary grinding?

Because it increases grinding production

The answer to obtaining fullest "cooperation" between the solid toxicants you process into dust bases or wettable powders and the grinding equipment you use to do the job can be expressed in one word—Attaclay. That goes for DDT, BHC, lindane, and solid forms of dieldrin . . . and for all types of reduction mills: hammer, attrition, roller, fluid energy.

Why? Because Attaclay has the edge in sorptive capacity needed to improve grinding rate. Its ultra-fine, divided, free-flowing particles mean you need exert only minimum grinding effort. It is a highly effective parting agent and grinding aid. And, aside from speeding up individual batches, Attaclay keeps downtime for "clean-out" at a rock-bottom minimum.

Attaclay's right there to protect you at other points, too. In the premix step, its high sorptivity easily handles any residual liquid which might be present in the technical chemical. Or, in the case of liquid toxicants, Attaclay cuts cycle times in the attrition milling or grinding steps following impregnation.

So here's a suggestion that should fit hand-in-glove with your 1952 production plans: whether the load factor is light, normal, or "chips down" when the rush is on, you can rely on Attaclay to help you get the *most* of a *fine product* from your plant. Write today—we're ready with prompt service.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Phila. 5, Pa.

JUST OFF PRESS—the second booklet in a newly-inaugurated series called Attaclay Pesticide Digest. These bulletins will discuss various aspects of pesticide processing. A brief note will bring your copy, and future Digests as published.

MEAT AND MILK

Greater utility of the less productive land is the objective of the Green Pastures movement.

The value of the Green Pastures Program is its contribution toward the production of more meat and more milk, at lower cost.

To achieve the goal of more and more productive acreage, P.C.A. pledges full cooperation with all interested agencies.

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Carlsbad, New Mexico

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AGRICULTURAL CHEMICALS

THIS MONTH'S COVER:

With more and more herbicides being used for brush control as well as weed control in crops, the toxicity hazard of these materials is a matter of increasing importance. (Read article, "Toxicity of Herbicides", page 42, this issue)—Photo by Davey Tree Expert Co., Kent, Ohio.

VOL. 7 No. 2

FEBRUARY 1952

A Monthly Magazine For the Trade

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LAWRENCE A. LONG
Editor

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In This Issue:

AGRICULTURAL CHEMICALS

Subscription Rates: *One year, United States, $3.00; Canada and Pan American countries, $4.00; Foreign, $5.00. Published monthly on the 15th by Industry Publications, Inc. Wayne E. Dorland, President; Ira P. MacNair, Secretary-Treasurer. Publication office, 123 Market Place, Baltimore 2, Md. Advertising and editorial office 175 Fifth Ave., New York 10, New York—Chicago Office, 333 N. Michigan Blvd. Advertising rates made known on application. Closing date for copy — 15th of the month previous to date of issue.*

Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

Partial aerial view of Naugatuck Chemical test fields and lab at Bethany, Connecticut

Here's where sales are sown!

Here's where Naugatuck chemicals begin—where Spergon®, Phygon® and Aramite* first showed signs of becoming the nationally famous products they are today.

Here's where Naugatuck Chemical's seed protectants, spray fungicides and insecticides of tomorrow must meet the tests of effectiveness, economy, plus ease and safety of use.

Yes, and here's where sales are sown! When the benefits of the Naugatuck chemicals developed here eventually reach the grower, they also reach the supplier and distributor in the form of new sales and new profits.

*U. S. Pat. No. 2,529,454

UNITED STATES RUBBER COMPANY

Naugatuck Chemical Division • Naugatuck, Connecticut

manufacturers of seed protectants – Spergon, Spergon-DDT, Spergon-SL, Spergon-DDT-SL, Phygon Seed Protectant, Phygon Naugets, Phygon-XL-DDT, Thiram Naugets – fungicides – Spergon Wettable, Phygon-XL – insecticides – Synklor-48-E, Synklor-50-W – fungicide-insecticides – Spergon Gladiolus Dust, Phygon Rose Dust – miticides – Aramite.

History repeats itself . . . grasshoppers will be stopped dead by Aldrin this year as they were last. Growers, formulators and dealers alike see the green of abundance when Aldrin is used for control of these destructive and all but universal pests of agriculture.

USDA-recommended at only 2 ounces of the chemical to the acre, headline news when announced, Aldrin is still the best news for all those concerned with 'hopper control; Aldrin, properly applied, gives just about perfect crop protection at lowest cost per acre.

To make 1952 a banner year for insecticide sales, formulate Aldrin for this big and dependable market.

Write us for complete information about Aldrin for grasshopper control and about Aldrin and Dieldrin for control of cotton pests and public health insects.

Julius HYMAN & Company
DENVER, COLORADO

Velsicol Chemical Corporation, New York City, exclusive distributors of patent-licensed Aldrin and Dieldrin in the United States.

Here's a versatile, fast-moving item which will sell because of its effective action against boll weevils, grasshoppers, locusts and many other pests. Colorado .44 Aldrin features quick action, low-dosage, ease of use, and economy.

For better, more economical control of a wider variety of agricultural pests, we suggest Colorado .44 Toxaphene. Colorado .44 Toxaphene is particularly potent when used against grasshoppers, alfalfa weevils, army worms, cutworms, lygus bugs, aphids and a variety of cotton pests.

If you're in the market for a profitable item for effective cotton and livestock control, don't overlook Colorado .44 BHC. Show the farmers how they, too, can reap greater benefit through Colorado .44 BHC.

Profit-eating livestock pests die fast when Colorado .44 Dairy Spray is used. This powerful insect killer will not harm cattle or humans if used as directed. It's a fast seller, and is fully approved by the USDA for use on dairy cattle. Non-toxic, non-injurious to livestock, poultry and warm blooded animals.

Weeds that rob crops of moisture, sunlight and vital minerals are always a problem to farmers. However, with Colorado .44 2, 4-D ester and amines in many economical formulations, weed and brush control can be achieved at a minimum of cost and labor. It will be of great benefit to you, because it's of great benefit to the farmer.

Sell widely-used Colorado .44 DDT to farmers and watch your profits soar. Colorado .44 DDT is an effective control against alfalfa weevil, lygus bugs and many other destructive insect pests. It is particularly profitable in the corn belt, for Colorado .44 DDT effectively controls the major pest of the corn crop.

To stop livestock weight losses resulting from ticks, lice and flies, recommend Colorado .44 Livestock Spray to your customers. It's the best solution for adding pounds to your cattle and other livestock, because it eliminates the annoyance of weight reducing pests. Colorado .44 Livestock Spray is also highly effectual as residual control in and around barns.

Recommend Colorado .44 Parathion. This versatile insect killer destroys the green bug in wheat and all small grains. Carry Colorado .44 Parathion and make your profits and the farmer's income greater. Also unusually effective against aphids, army worm and many other destructive insects.

For effective control of mites, lice, flies and fleas on livestock, recommend Colorado .44 Lindane. Customers will appreciate the outstanding results of Lindane in controlling livestock pests. Lindane is also formulated to destroy many other agricultural insect pests—including grasshoppers and ants.

By stocking up on Colorado .44 Chlordane, you insure having on hand a quick and permanent knockout for all wheat insects. It's easy to sell consumers on the idea that crop losses can be eradicated by Colorado .44's triple killing action, which kills three ways: (1) by vapor, (2) by stomach poison, (3) by contact.

Colorado .44 Grub Dust gives almost 100% protection against cattle grubs and lice, thus reducing livestock weight losses. Can be used as a dust, spray or dip. Just add a 7½ lb. pack of Colorado .44 Grub Dust to each 100 lbs. of water—it kills cattle pests fast! Profits come naturally.

Colorado .44 2,4,5-T helps farmers make a better harvest faster, easier and at less cost. This means more profit and more good will for dealers, for Colorado .44 2,4,5-T is an effective weed and brush killer. STOCK! DISPLAY! SELL! Colorado .44 2,4,5-T.

Plus 148 Other Agricultural Chemicals

The complete 160 Colorado .44 products offer you a more varied line than you'll ever require. Our technical service department will give you detailed information on any specific need. Inquire today!

FOR MAXIMUM COVERAGE WITH MINIMUM WASTE USE CONTINENTAL CLAY AS YOUR CARRIER

With Continental Clay as your carrier, you can insure the effectiveness of both your high bulk dusts and wettable concentrates.

Continental is an economical, top quality clay that gives greater acre coverage. Its unusually fine particle size is only 0.8 micron by air permeation.

WETTABLE CONCENTRATES

Continental Clay wets as readily as any carrier tested in the Vanderbilt Laboratory. Highly compatible, Continental is safe to use with all types of toxicants. Continental gives finely dispersed suspensions that are completely free from any agglomeration.

HIGH BULK DUSTS

Continental Clay is uniform to assure even distribution of the toxicants. Only 0.75% is retained on a 200 mesh screen. Its compatibility insures full effectiveness of the toxicant. Its high bulk gives increased absorptiveness and excellent flowability to finished dusts.

Don't gamble when formulating dusts or sprays. Use Continental Clay — always in adequate supply.

R. T. VANDERBILT CO.

Specialties Department

230 Park Avenue **New York 17, N. Y.**

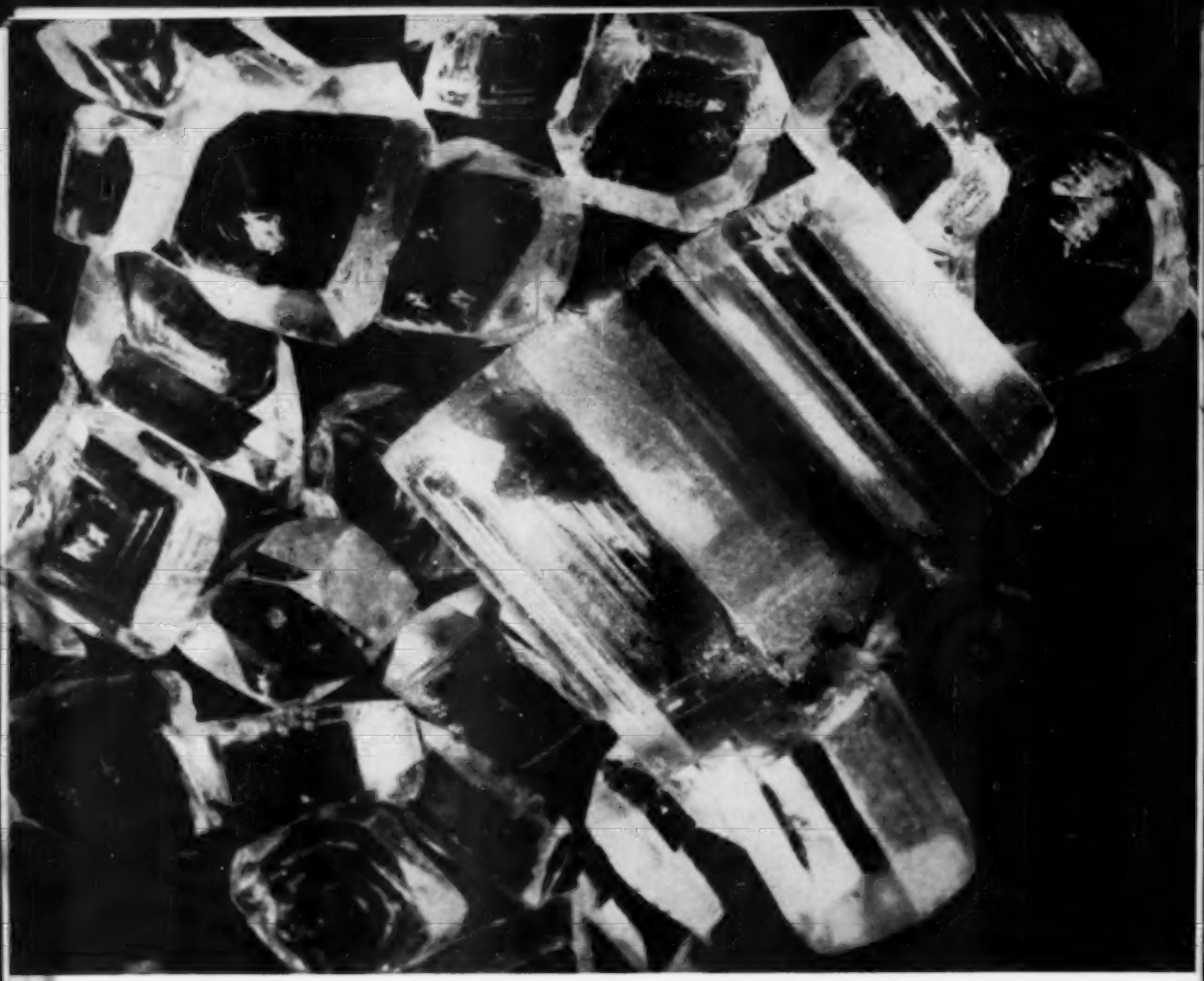
☐ Please send technical information on CONTINENTAL CLAY.

☐ Please send sample of CONTINENTAL CLAY.

NAME .....

POSITION .....

(Please attach to, or write on, your company letterhead)



Announcing LINDANE

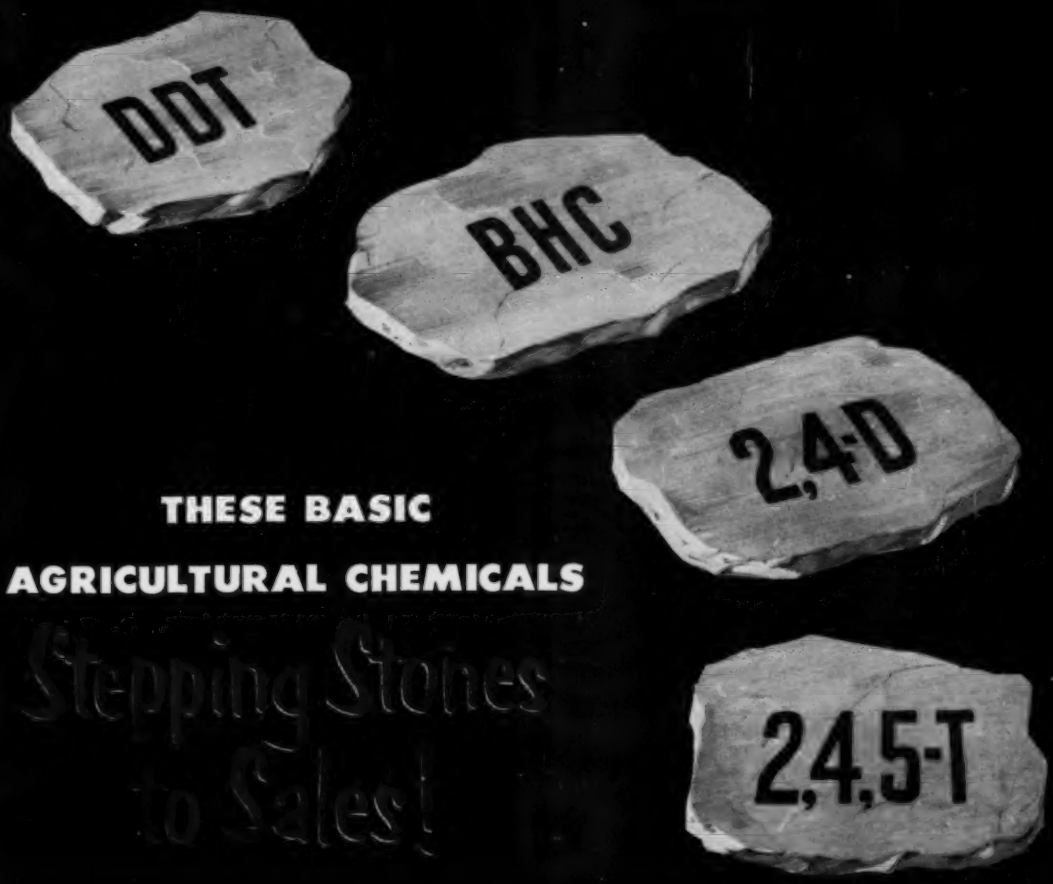
LINDANE is a new product of DIAMOND ALKALI's subsidiary, KOLKER CHEMICAL WORKS, INC., specializing in organic chemicals for agriculture and industry. *Write today for prices and specifications on* LINDANE *to:*

KOLKER CHEMICAL WORKS, INC.
80 LISTER AVENUE, NEWARK 5, NEW JERSEY

DIAMOND ALKALI CHEMICALS

LINDANE, the effective multi-purpose insecticide containing 99% gamma isomer of benzene hexachloride is now available in commercial quantities. LINDANE, together with KOLKER high gamma BHC technical, now offer manufacturers basic BHC materials easily handled and readily formulated into high-quality finished insecticides.

DIAMOND ALKALI COMPANY
Chemicals you live by



THESE BASIC AGRICULTURAL CHEMICALS

Stepping Stones to Sales!

DDT	100% Technical Wettable Powders Dust Concentrates Emulsifiable Solutions
BHC	Lindane (99% gamma isomer) Technical grade (36% gamma) 12% gamma concentrates
2,4-D	Butyl Ester Isopropyl Ester Ester and Amine Salt Solutions Low-volatile Esters
2,4,5-T	Isopropyl and Butyl Esters Low-volatile Esters

DIAMOND ALKALI COMPANY

Chemicals you live by

Products of DIAMOND ALKALI's subsidiary, KOLKER CHEMICAL WORKS, *specializing in organic chemicals for agriculture and industry.*

Order from

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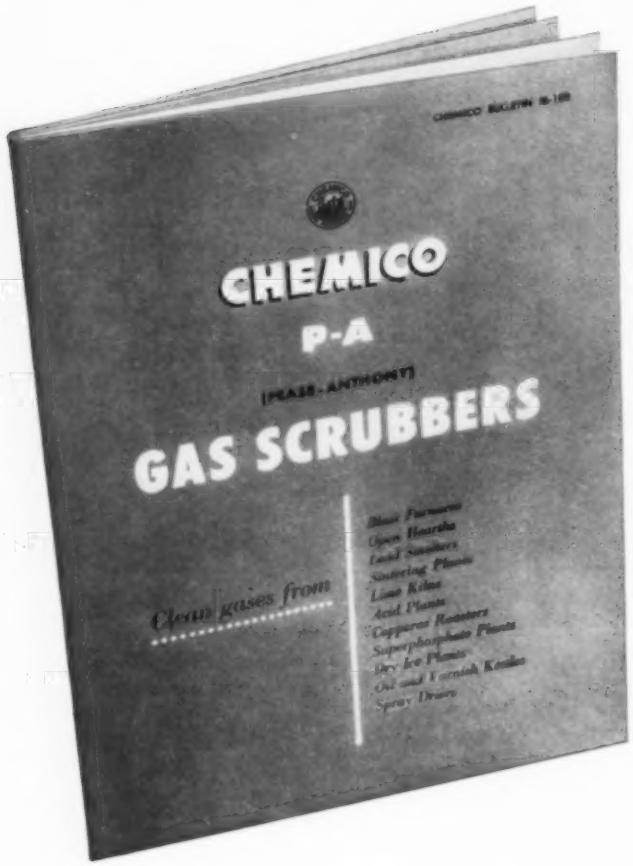
DIAMOND ALKALI CHEMICALS

High Gas Scrubbing Efficiency
AT LOW COST!



This Chemico bulletin contains factual information on the two types of Chemico P-A Gas Scrubbers. Both scrubbers offer high collection efficiency at low cost. Both are now being successfully used in a wide range of industries.

The bulletin gives performance data on the *P-A Venturi Scrubber* that effectively and economically removes sub-micron dusts, fumes and mists from industrial gases, and the *P-A Cyclonic Scrubber* for the removal of micron-size dusts from gas streams. If you have a gas scrubbing problem, write us detailing your specific requirements.

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

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CABLES: CHEMICONST, NEW YORK

TECHNICAL REPRESENTATIVE IN EUROPE—CYANAMID PRODUCTS LTD., LONDON

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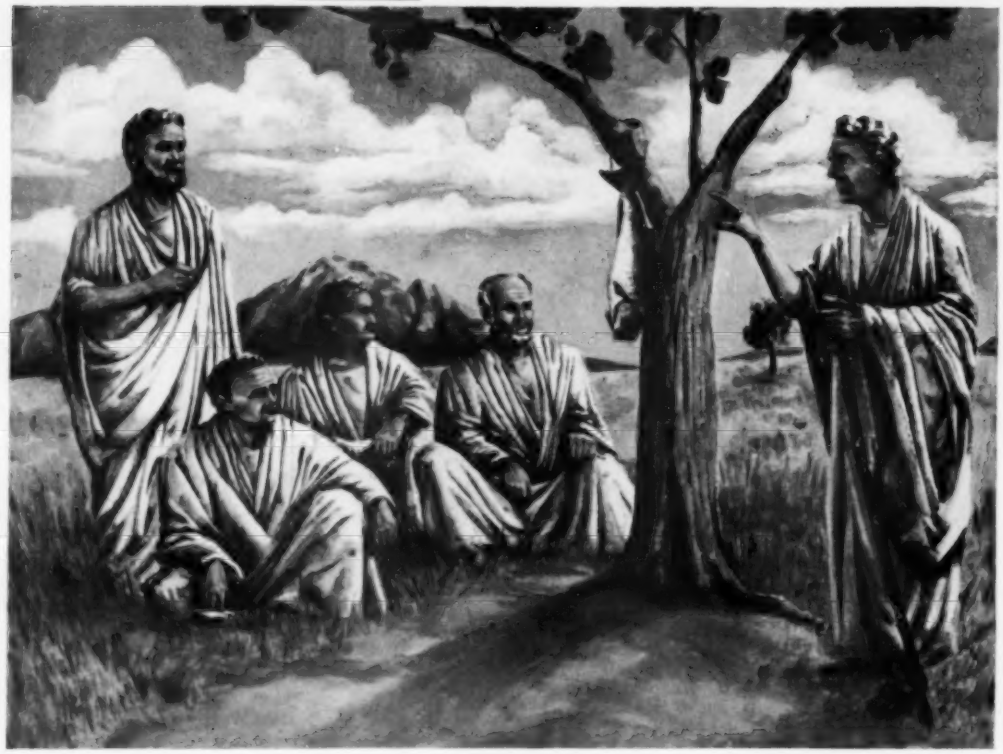
Chemico plants are profitable investments

CC 119

Now *there* was a recommendation!



"Hang a fish," said Pliny the Elder ...

"near your fruit trees and the ants will collect in one spot."

Fortunately for Pliny's reputation, he left more to posterity than his agricultural recommendations. But, if he sounds like a man who would have trouble making a passing grade in Freshman Entomology, the orchardists back in 69 A.D. regarded Pliny's "inside information" as top-drawer.

They sat in rapt respect as Pliny, with an acute display of perception, observed that "ants are a great pest to trees" but that a dead fish would so outrage the little creatures' nasals as to start a stampede.

Happily, fish are no longer on the approved list of pesticides. However, during the almost 1900 years that have elapsed since Pliny's day science probed many dark and fruitless avenues before Geigy Company, Inc. revolutionized the insecticide industry by originating DDT insecticides.

Therefore, whatever your requirements remember that Geigy Company, Inc. represents the highest standards of quality, dependability and service.

Aldrin	Chlordane	Fumigants	Pentachlorophenol	TDE (DDD)
Arsenicals	Copper	Lindane	Purified DDT	Toxaphene
BHC	DDT	Methoxychlor	Rotenone	2,4-D & 2,4,5-T
Carbamates	Dieldrin	Parathion	Sulphur	Specialty products

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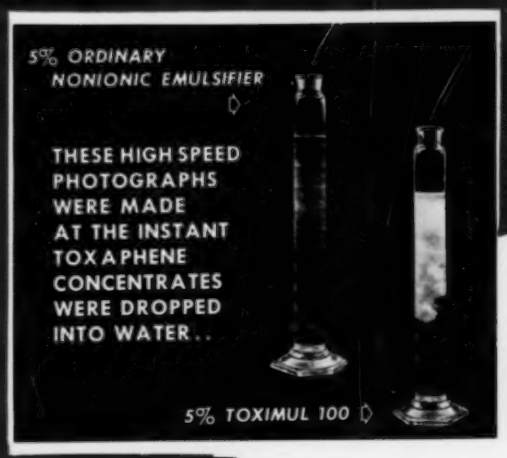
89 Barclay Street New York 8, N. Y.

Aberdeen, N. C.; Burlington, Iowa; Colorado Springs, Colo.; Elkton, Md.; Fresno, Calif.; Houlton, Me.; Leland, Miss.; McGregor, Tex.; Orlando, Fla.; Walla Walla, Wash.



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SPONTANEOUS DISPERSION

use

TOXIMUL

a balanced anionic emulsifier for agricultural insecticides

TOXIMUL is the family name of Ninol Laboratories' new series of Emulsifiers, designed to improve performance and reduce costs of biocidal spray concentrates. Various members of the series have been developed for use with different types of insecticides such as Toxaphene, Chlordane, DDT, etc.

TOXIMUL 100, for example, features *spontaneous dispersion* when used in Toxaphene emulsion concentrates. When added to water of any hardness, concentrates containing TOXIMUL 100 form stable emulsions with a minimum of agitation. Such concentrates are therefore ideal for general agricultural use, and particularly where agitation conditions are poor . . . as in aeroplane sprayers, knapsack tanks and cattle dips.

SEND THIS COUPON TODAY!

NINOL LABORATORIES, DEPT. A
1719 S. CLINTON ST., CHICAGO 16, ILL.

Gentlemen:

Please send me sample and further information about TOXIMUL emulsifiers. Our **major product type is:**

☐ Toxaphene ☐ Chlordane ☐ DDT

☐ (other) _____

NAME _____

TITLE _____

COMPANY _____

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Detergents — Emulsifiers

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In Canada: Chemical Developments of Canada, Ltd., Toronto 17, Ontario

ATLOX® EMULSIFIERS ARE THE LEADERS...

- ***In usage.*** Agricultural chemical producers use more Atlox emulsifiers than any other kind.
- ***In versatility.*** There's an Atlox emulsifier for every type of insecticide or herbicide—emulsifiable or oil-diluted concentrates, for use in knapsack, low-gallonage, or high-gallonage sprayers.
- ***In chemical stability.*** Atlox emulsifiers are virtually chemically inert . . . give concentrates excellent shelf life.
- ***In technical service.*** Atlas provides practical help in developing formulas.
- ***In dependability of supply.*** Atlas met all delivery commitments in 1951. Additional production facilities assure ample supplies for 1952.

Send for the useful 24-page booklet "Atlox Surface Active Agents for Formulating Agricultural Chemicals." It gives formulas, testing methods and other valuable information. Technical assistance is always available.

ATLOX—Reg. U.S. Pat. Off.

Industrial Chemicals Department

ATLAS POWDER COMPANY

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Offices in Principal Cities

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BRANTFORD, CANADA

AS WE GO TO PRESS . . .

Asks New Legislation on Pesticides

L. G. COX, director of technical projects for the Beech-Nut Packing Co., told the Delaney Committee a at session in Washington, January 31, that new legislation is neccessary to control use of insecticides on food products. He termed the present Food and Drug Act as antiquated.

"Any insecticide residue which tends to accumulate in fatty tissue should be eliminated in so far as possible from the baby's diet at the time when milk and prepared baby foods are the major part of its diet", he testified, indicating that his company has spent substantial sums of money in its efforts to keep insecticide residues out of the baby foods and peanut butter which it produces.

Mr. Cox made the following specific recommendations:

The Department of Agriculture and at least four regional experiment stations should cooperate in testing new pesticides and in recommending their use "on a sound, scientific basis with protection to the farmer, the food processer, and the consumer."

The Public Health Service should make necessary tests to establish proper tolerances for chemicals.

The Food and Drug Administration should have full responsibility for enforcing such tolerances.

Laws should be enacted to require evidence of adequate toxicological testing, data on residues and recommendations for their removal, the publication of tolerances in The Federal Register, sample analyses on shipments and public warnings and seizures where tolerances were exceeded.

Sees Danger Overrated

No serious danger to the public from insecticide residues exists, according to the views of Dr. Russell M. Wilder, as expressed in a report to the New York Academy of Medicine. Dr. Wilder did express a fear that our eating is too civilized, that our diet may leave us undernouriahed, since some basic diet items are now lacking in essential nutrients which are lost in food processing.

But as for additives, which he listed as incidental (arsenates used in spraying fruit trees, DDT and other chemicals for insect control) and intentional, (synthetic flavors, sweeteners and artificial coloring), Dr. Wilder said: "No harm of serious consequence is apparent from the use of additives".

•

Illinois Applicators Elect

The 4th annual Illinois Custom Spray Operators Training School was held at the University of Illinois, Urbana, January 24 and 25, with approximately 225 in attendance, including 86 applicators. Joseph Garland of Dixon, Ill., was elected president of the Ground Applicators group for the coming year, with Ralph Blair of Mahomet as vice-president, and A. E. Pickard of Mt. Vernon as secretary-treasurer. The Aerial Operators elected Don Rickard of Princeton, Ill., as president and Robert Ueding, Lawrenceville Municipal Airport, Lawrenceville, Ill., as secretary-treasurer.

•

Mo. Hort. Society Elects

Paul Stark, Jr., of Louisiana, Mo., was elected president of the Missouri Horticultural Society at the annual meeting held January 23-24. Other officers elected included G. E. Storms of Grain Valley, 1st vice-president, Winton Young of Springfield, 2nd vice-president, and W. R. Martin, Jr., of Whitten Hall, Columbia, as secretary-treasurer.

Delta Builds Plant

Construction of a building to house the $100,000 plant of the Delta Insecticide and Chemical Co. at North Little Rock, Ark. was begun in January.

The newly-organized company, operating as an affiliate of Stauffer Chemical Co., New York, will produce and market agricultural insecticides for cotton growers in a seven-state area. Sales of all products will be handled in Arkansas, Texas, Oklahoma, Missouri, Tennessee, Mississippi and Louisiana by the Adkins-Phelps Seed Co., North Little Rock, president of which is Homer N. Adkins, formerly Governor of Arkansas. Operation of the new plant is expected to begin about March 15.

•

Sees Adequate Supply

With the exception of pyrethrum, most raw materials used in insecticide formulation are in satisfactory supply, a representative of the National Production Authority told members of the Houshold, Industrial and Dairy Insecticides Industry Advisory Committee at a meeting in Washington, January 31. The committee asked that NPA urge government agencies which have been stockpiling pyrethrum to consider releasing some of their stocks for commercial use. They were advised, however, by NPA that no such plans are under consideration.

•

Watts to N. C. Safety Post

C. J. Watts, Jr., assistant manager of the NACO Fertilizer Company plant in Wilmington, N. C., has been appointed chairman of the newly-formed fertilizer safety section of the North Carolina State Safety Conference. Announcement of the appointment was made by H. S. Baucom, Director of Safety for the Industrial Commission of North Carolina.

The newly-established section, which Mr. Watts will head, has been organized to strengthen and coordinate safety programs of fertilizer producers in North Carolina.

Lindane For Armed Forces

The U. S. Quartermaster Corps, Research and Development Division, has specified lindane for control of various insects affecting military personnel and other quarters. Close to a million pounds of lindane insecticide dusting powder were scheduled for December delivery by the California Spray-Chemical Corp., Richmond, Calif., for shipment to the armed forces in Japan and Korea.

The approval of lindane has coincided with dispatches from armed forces scientists connected with the Korean campaign who reported that DDT, once considered one of medicine's greatest military weapons for control of lice transmitting typhus fever "now appears to be of uncertain value." Korean strains of body lice, potential carriers of typhus, are highly resistant to DDT. Military scientists are counting on lindane to solve the problem.

The Quartermaster Corps will provide dusting lindane containing 1 per cent lindane for skin dusting; for dusting inner surfaces of armed forces' uniform and underwear, blankets and the soil or floor immediately surrounding bedding; and for treating buildings and other insect-infested areas.

•

Symposium on Fungicides

A Symposium on Fungicides, consisting of invitational papers presented before the American Chemical Society in Philadelphia, on April 12, 1950, comprises a special issue of the Contributions from Boyce Thompson Institute (Volume 16, Number 7, 1951). These papers will not be available in reprint form. The complete Symposium Issue may be purchased at $1.00 per copy. It contains the following papers:

The economics of using fungicides—R. H. Wellman; Testing techniques —S. E. A. McCallan; Derivatives of dithiocarbamic acid as fungicides — W. H. Tisdale and A. L. Flenner; Fungitoxicity of heterocyclic nitrogen compounds — James G. Horsfall and Saul Rich; Phenolic fungicides in agriculture and industry — R. H. Gruenhagen, P. A. Wolf, and E. E. Dunn; Fungitoxicity and biological activity of quinonex — George L. McNew and Harry P. Burchfield; and Chromate complexes as fungicides —F. R. Whaley and J. B. Harry.

Orders for the Symposium issue should be addressed to: Publication Department, Boyce Thompson Institute for Plant Research, Inc., 1086 North Broadway, Yonkers 3, New York.

•

D. B. Faloon Dies

Dalton B. Faloon, president of Hammond Paint & Chemical Co., Beacon, N. Y., died at his home in Beacon, January 31. He was 56. With his brother, O. James Faloon, he had operated the Hammond concern for twenty years, manufacturing agricultural insecticides. They also operated Rose Manufacturing Co., which specialized in horticultural products.

•

Nomenclature Bulletin Out

A list of pesticides has been prepared by the U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine. The list indicates by asterisks and other symbols, the common names, their definitions, and other designations used for the same material. As an example, dieldrin is a common name, to be used in uncapitalized form in publications. It is defined as "not less than 85% of 1,2,3,4,10,10-hexachloro - 6,7, - epoxy - 1,4,4a,5,6,7, 8,8a, - octahydro - 1,4,5,8 - dimathanonaphthalene. Under other designations, it has also been known as "compound 497".

The bulletin gives not only common names of insecticides, but also trade names. Common names are those approved by the Interdepartmental Committee on Pest Control. Author of the bulletin is Dr. H. L. Haller, assistant chief, Bureau of Entomology and Plant Quarantine, Washington. Copies are available from the U. S. Department of Agriculture.

Southern Meetings

The Fertilizer Section of the Southern Safety Conference will meet at Atlanta, March 3. The program will include a talk on how to organize an accident prevention program in a fertilizer plant, and a symposium on achieving safety in fertilizer plants. The chairman of the session will be V. S. Gornto of Smith-Douglass Co., Norfolk, Va.

The Fertilizer Section meeting of the North Carolina State Safety Conference is to be held May 6 at Ashville, N. C. The Fertilizer Section of the Virginia State Safety Council is planned for May 16 at Richmond.

•

New Sulfuric Plant

Monsanto Chemical Co., is planning construction of a 250-ton sulfuric acid plant on an 86-acre site at Avon, Calif. The plant, which will utilize waste sludge and hydrogen sulfide piped from the adjacent Tide Water Associated Oil Company refinery, will be owned jointly by Monsanto and Tide Water Associated. It is expected to be in operation by the end of 1952.

•

New Phillips Expansion

Phillips Chemical Company, Bartesville, Oklahoma, recently anannounced that it plans to build an ammonia methanol and petro-chemical plant near Houston and expand other plants under an arrangement with a group of banks for a $50, 000,000, credit on a standby basis. Proceeds of the loan will be used to finance the firm's long-range expansion program.

•

Change Pac. AAEE Meeting

The meeting of the Pacific Branch of the AAEE will be held June 24-26 at the Mar Monte Hotel, Santa Barbara, Calif., instead of June 17-19 as originally announced.

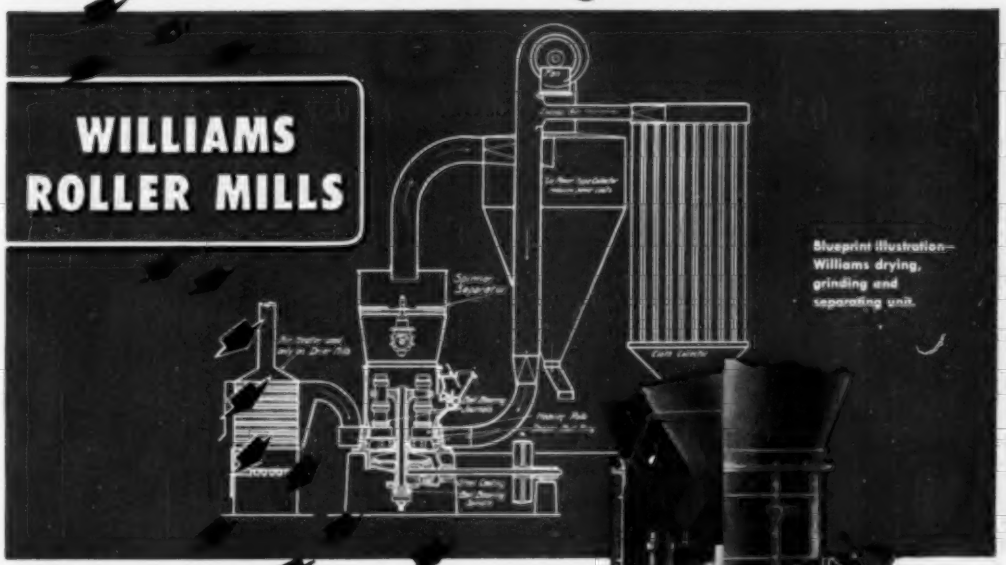
•

Federal Appoints Harding

J. Walter Harding has been appointed Manager, Purchasing and Traffic, of Federal Chemical Company, Louisville. Mr. Harding was Traffic Manager and has been with Federal four years.

For those Fine Grinding Jobs . . .

WILLIAMS ROLLER MILLS



Blueprint illustration—Williams drying, grinding and separating unit.

200 to 325 mesh Grinding

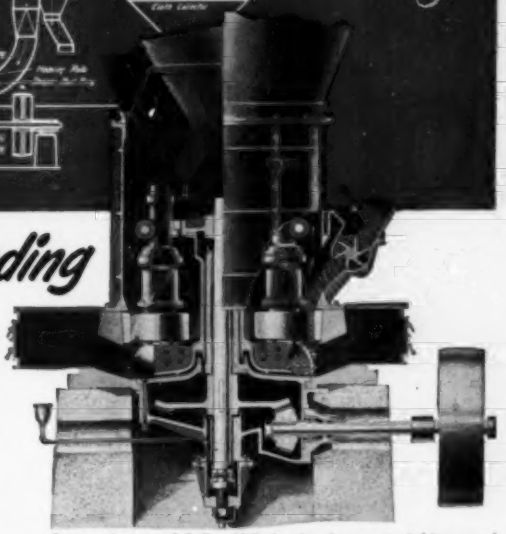
Fine grinding of insecticide powders can ONLY be done economically with PROPER fine grinding equipment and we believe the Williams Roller Mill with Air Separation is the finest mechanical method of material reduction on the market today.

Experienced, engineering know-how, embodied in the design of the unit permits the production of high concentrations of DDT, BHC, Toxaphene, etc., — thoroughly blended. Also pulverizes Pyrethrum, Rotenone, Sulphur for Dusting and Gypsum, Limestone, Rock Phosphate and similar products on an around-the-clock schedule.

Control of product size is assured with the Spinner Air Separator. Finenesses of 98% and 99.9%, 325 mesh are obtainable and can be consistently maintained. A clean, dustless installation from feed opening to finishing product bin, all automatically handled, makes this unit additionally desirable for your plant.

Williams Roller Mills are available in a full range of sizes.

WC-51-1



Sectional view of Roller Mill showing how material is ground between rolls and bull ring, then air swept to Separator which extracts fines and returns oversize for re-grinding.

WILLIAMS ALSO MAKES . . .

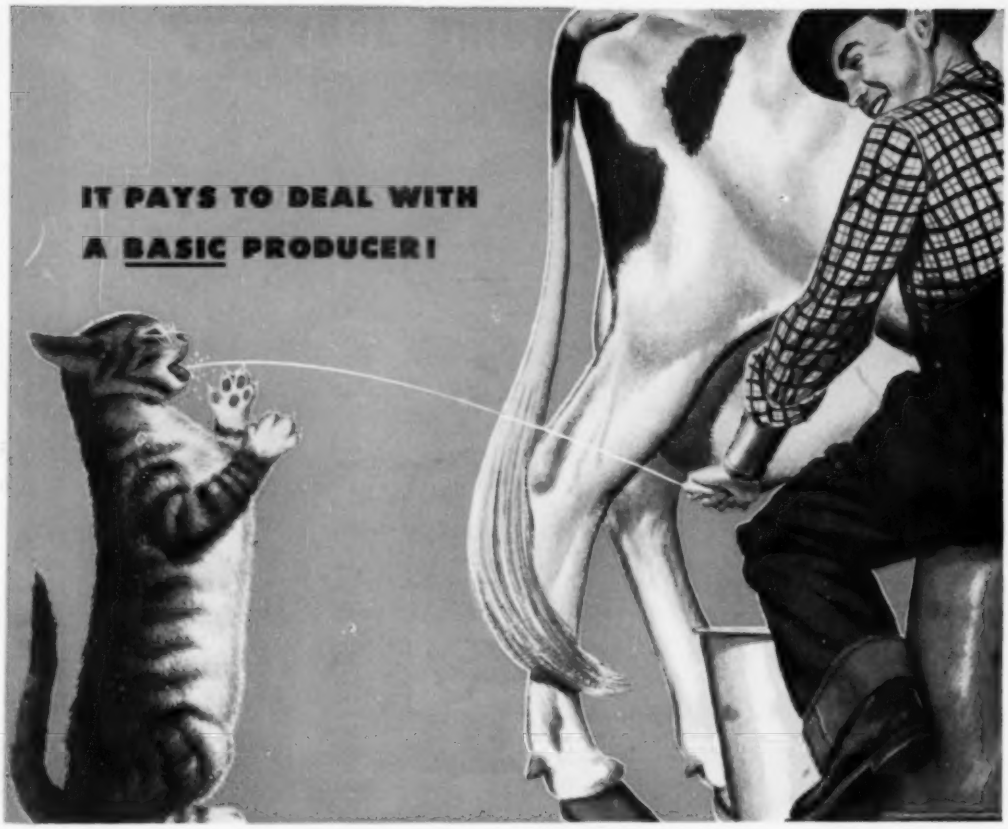
Heavy Duty Hammer Mills for crushing and grinding rock phosphate, gypsum, limestone . . . also for disintegrating ammonium sulphate lumps and fertilizer mixes that "set-up" in storage. The Helix-Seal Pulverizer for disintegrating and blending insecticide mixes and concentrations ready for use.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
2707 N. BROADWAY ST. LOUIS 6, MO.

Oldest and Largest Manufacturer of Hammermills in the World

WILLIAMS

CRUSHERS GRINDERS SHREDDERS



How about you? If you manufacture finished insecticides, there are many advantages for you in buying directly from PENNSALT — a *basic* producer of chemicals.

PENNSALT offers you a single, dependable source for your technical materials and concentrates. All PENNSALT products are *consistently dependable* — Pennsalt's own research and testing facilities provide quality control from start to finish.

And PENNSALT agricultural chemicals offer you extra compounding benefits, too!

Here are two good examples:

PENTECH, the unique *friable* DDT; made by Pennsalt's patented process for ease of blending and reduced cost of processing.

PENNSALT BHC TECHNICAL 36, with 36% gamma isomer, proportionately less of the other isomers. This means you handle and store up to ⅔ less of the technical materials.

We'll be glad to send you complete information on prices, delivery and Pennsalt technical assistance; just write to the office nearest you.

Agricultural Chemicals Department
PENNSYLVANIA SALT MANUFACTURING COMPANY
Philadelphia 7, Pa. • Tacoma, Wash.
Bryan, Texas • Montgomery, Ala.
Los Angeles and Berkeley, Calif. • Portland, Ore.

Some Pennsalt Technical Materials & Concentrates:
PENTECH, DDT • PENNSALT BHC TECHNICAL 36 • KRYOCIDE (natural cryolite) • HI-GAM, 99 (lindane) • DD-50 (50% DDT dust base) • BHC D-12 (12% gamma dust base) • BHC-DDT 9:15 (dust concentrate)

PENNSALT CHEMICALS
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bags for all industry and agriculture

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Du Pont Announces

80% CMU

WEED KILLER

An Outstanding New Herbicide for

RAILROAD RIGHTS-OF-WAY and INDUSTRIAL AREAS

Results with Du Pont 80% CMU Weed Killer are promising, as the photo indicates. CMU applied in April to the track at the right in the photo showed this result in August. The track at left in the photo was untreated.

Tests by Du Pont and other investigators throughout the United States and Canada indicate that CMU provides effective control of grass and broadleaf weeds. Du Pont 80% CMU Weed Killer is absorbed by the roots and controls all types of vegetation.

As a result of these characteristics, CMU at present seems best adapted for use on areas where no vegetation is desired, such as railroads, power stations, tank farms, pole yards, fire breaks and other industrial areas.

Du Pont CMU has certain other advantages as a weed-killer spray. It is non-volatile and thus reduces danger to nearby plants. It is nonflammable, and it doesn't corrode application equipment.

Since CMU is a new product, full-scale production is not yet under way, and only limited quantities are available at present. CMU is now being recommended for use along railroad tracks and in industrial areas, but is not currently recommended for use on cropland.

However, it is being tested for other possible uses, such as control of weeds in some crops. For full information, write to Du Pont, Grasselli Chemicals Department, Wilmington, Delaware.

DU PONT CHEMICALS FOR THE FARM INCLUDE: *Fungicides:* PARZATE® (Liquid and Dry), FERMATE®, ZERLATE®, Copper-A (Fixed Copper), SULFORON® and SULFORON®-X Wettable Sulfurs . . . *Insecticides:* DEENATE® DDT, MARLATE® Methoxychlor, LEXONE® Benzene Hexachloride, KRENITE® Dinitro Spray, EPN 300 Insecticide, Calcium Arsenate, Lead Arsenate . . . *Weed and Brush Killers:* AMMATE®, 2,4-D, TCA and 2,4,5-T . . . Also: Du Pont Cotton Dusts, Du Pont Spreader-Sticker PARMONE® Fruit Drop Inhibitor and many others. ®REG. U. S. PAT. OFF.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

DU PONT

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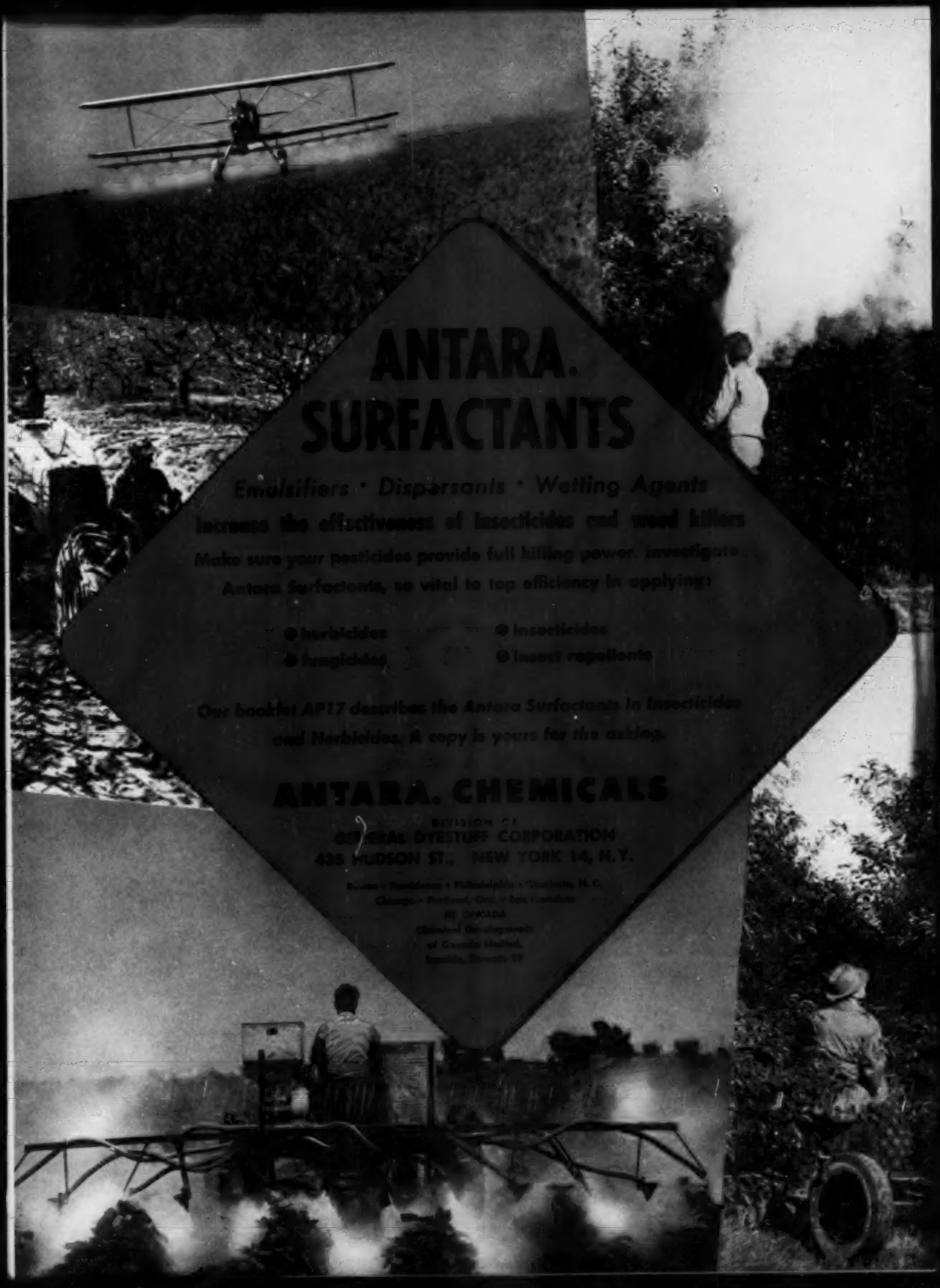
BETTER THINGS FOR BETTER LIVING

. . . THROUGH CHEMISTRY


ANTARA.
SURFACTANTS
Emulsifiers · Dispersants · Wetting Agents
Increase the effectiveness of insecticides and weed killers
Make sure your pesticides provide full killing power. Investigate Antara Surfactants, so vital to top efficiency in applying:
● herbicides
● fungicides
● insecticides
● insect repellents
Our booklet AP17 describes the Antara Surfactants in Insecticides and Herbicides. A copy is yours for the asking.
ANTARA. CHEMICALS
DIVISION OF
GENERAL DYESTUFF CORPORATION
435 HUDSON ST., NEW YORK 14, N.Y.

Protection that won't rain away

ARMOUR STICKER helps protect this valuable crop when it needs protection most!

Just after rainfall, insects are very active — and plants unprotected. The usual insecticides are washed away by rain, to the point where they fail to do their job. The crop is completely open to damage. That is, unless you use Armour STICKER.

During the next year, every acre under cultivation *must* produce more. With an impending shortage in phosphate fertilizer, more of the load of increasing production must be carried by insecticides and fungicides.

Armour STICKER was designed to help increase the length of time a pesticide or fungicide stays on the leaf. It reduces losses due to run-off during spraying or dusting. And, more important, STICKER becomes water-resistant after two or three hours exposure to sunlight. Thus your formulation stays on the leaf, where it is needed, when it is needed. And at harvest time, when it should come off, it washes off with usual methods, without extra labor.

STICKER is compatible with all inert materials and all commonly used protectives, such as DDT, lead arsenate, rotenone, chlordane, pyrethrum, toxaphene, etc. In dust formulations, it does not affect flowability, even when added in greater than recommended amounts. In sprays, STICKER has no effect on the viscosity of the solution.

Write today to Armour for more detailed information on how STICKER can increase the protective power of your sprays or dusts. Specifications on recommended amounts and methods of application will be sent promptly. Remember, to increase protection, formulate with STICKER.

ARMOUR *Adhesive Division*

Armour and Company • 1355 West 31st Street • Chicago 9, Illinois

Fundamental in the Arkell & Smiths philosophy is the precept that specialists should control every phase of the operation. Only by the correlation of sound thinking throughout every step in the designing, printing and construction of multiwall and specialty bags can the incomparable A&S quality be guaranteed.

To this end, A&S maintains a staff composed of packaging specialists . . . Development Engineers to tackle and solve your individual packaging problems . . . an Art Department that builds visual impact into the flat exterior of your package . . . Production Specialists with all the skills and experience acquired through 93 years of continuous specialization in the manufacture of paper bags.

Why not analyze your various packages now and consider the use of new, improved multiwall and specialty bags being designed and produced by the A&S Packaging Team. Address your inquiry to Packaging Engineer, Arkell & Smiths, Canajoharie, New York.

ARKELL and SMITHS

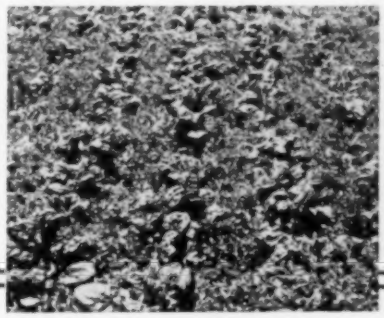
CANAJOHARIE, N. Y. · WELLSBURG, W. VA. · MOBILE, ALA.

ARKELL & SMITHS · THE OLDEST NAME IN PAPER BAGS · A&S

Continuing Experiments and Research Show Columbia-Southern Chloro-IPC

EFFECTIVE IN A VARIETY OF CROPS

Photograph left shows how effectively Chloro-IPC has controlled chickweed in spinach. Soil was sprayed in April on day of planting with two pounds of Chloro-IPC per acre. Photograph right shows untreated spinach area.



In last month's issue of Agricultural Chemicals, Chloro-IPC was introduced as the promising new herbicide exclusively developed by Columbia-Southern. The use of Chloro-IPC was discussed for the control of certain annual grass and broadleaved weeds in the production of cotton and onions.

The current article concerns the control of weeds in a variety of other agricultural crops. Where the problem is one of annual grass weeds or chickweed in alfalfa and similar legumes, Chloro-IPC promises the answer. As little as three pounds of Chloro-IPC per acre applied during winter dormancy on established stands of alfalfa has given complete control of chickweed. With annual grasses, the dosage should be increased to about six pounds per acre. At these dosages no injury has resulted, but inhibition and injury have been reported at twelve pounds per acre. Pre-emergence treatment and treatment of seedling alfalfa should be made at dosages of three pounds per acre or less until more data is available. Red clover and sweet clover may be more susceptible and ladino less susceptible than alfalfa.

Pre-emergence treatment of soybeans with Chloro-IPC shows outstanding promise, six pounds per acre being indicated as the effective dosage. Other beans such as *green beans and lima beans may be similarly treated.*

Cowpeas, field peas, and peanuts have also been very successfully treated with Chloro-IPC by pre-emergence treatment. In the case of peas, it may be possible to use Chloro-IPC in *pre-planting* treatment, working the herbicide into the soil to control deep-sprouting varieties such as wild oats.

Promising results also have been shown for control of certain weeds in sugar beets, table beets, lettuce, spinach, collards, perennial grasses, strawberries and mint.

Flax, the cucurbits and the small grains appear to be quite susceptible to Chloro-IPC and little hope can be held for the selective control of weeds in these crops.

Although it is known that many annual grasses may be controlled with Chloro-IPC, there is no indication that established perennial grasses can be controlled. However, the germinating seeds of perennial grasses should be killed as easily as the germinating seeds of annual grasses. Chloro-IPC apparently has no effect on nutgrass, Canada thistle, and groundsel.

In addition to controlling annual grasses, Chloro-IPC has been reported to give various degrees of control of shepherd's purse, lambsquarters, wild buckwheat, chickweed, purslane, carpet weed, sheep sorrel, red root pigweed, kochia, verbena, morning glory, cocklebur and cinquefoil.

The LD_{50} for Chloro-IPC is somewhat greater than 1500 mg./kg. This may be compared with about 250 mg./kg. for DDT and 125 mg./kg. for lindane. No toxic effects resulted when Chloro-IPC was kept in contact with shaven skin of white rats for 24 hour periods.

You are invited to write to Columbia-Southern today for further information on Chloro-IPC. A reprint of the first article, which appeared in last month's issue of Agricultural Chemicals, also is available by writing to the company address below.

COLUMBIA-SOUTHERN
CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
FIFTH AVE. AT BELLEFIELD · PITTSBURGH 13, PA.

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DISTRICT OFFICES: BOSTON • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • HOUSTON • MINNEAPOLIS • NEW ORLEANS • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS

CONTROL { INSECTS / WEEDS / FUNGUS / FERTILIZER } AT LESS COST WITH...

WARREN Hi-Clearance

HEAVY-DUTY self-propelled SPRAYER

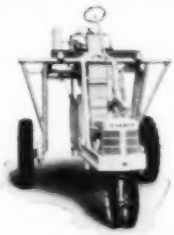
because it's built for dependable year 'round operation

Owners say, "Warren keeps our entire spray program on the ground. Costs per acre are low—chemical control is more effective."

Warren is fast and versatile—works equally well in high or low crops. It's adaptable to year 'round spraying of insecticides, fungicides, herbicides and will apply liquid fertilizer.

Buy Warren and you get a machine that will handle your complete spray program. *Some of the largest canners and commercial operators own fleets of Warren Sprayers.*

Write TODAY For Detailed Literature and Price Lists



CHECK THESE CROP-SAVING FEATURES

- Pump capacity up to 20 g.p.m.
- Pump pressures up to 800 lbs.
- Crop clearance—7 feet.
- Mechanical agitation in 275-gal. tank.
- Welded tubular construction.
- Powered by 24 h.p. International.

WARREN DIVISION—AMERICAN STEEL DREDGE CO. INC.
DEPT. AC—FORT WAYNE, INDIANA


Improve
your insecticide
with
Alcoa Cryolite
Alcoa Cryolite is a standard, high-power insecticide, approved by state experiment stations. It is compatible with insoluble-type copper compounds, sulphur and other neutral fungicides, insecticides and diluents. Its properties are dependable and can help make your insecticide better.
Here's how—
Alcoa Cryolite is Selective. Kills harmful, chewing insects, but has no appreciable effect on bees and other beneficial insects. Does not kill birds or other wild life.
Alcoa Cryolite is Safe. Does not affect soil balance. Safe on delicate foliage. Not acutely poisonous to humans.
Particle size is Uniformly-controlled. Just right for maximum, even coverage. High suspendability in spray tank. Free dusting and spraying.
Particles are Smooth. Negligible abrasive effect on equipment. No jagged edges, because particles are not formed by crushing.
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Alcoa Chemicals
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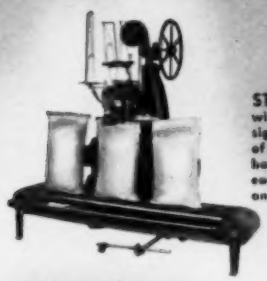
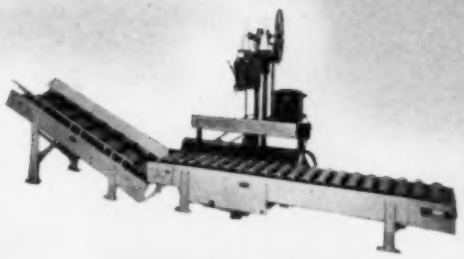
For further information write to ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 641 Gulf Bldg., Pittsburgh 19, Pennsylvania.

BAG CLOSING MACHINES *Engineered*

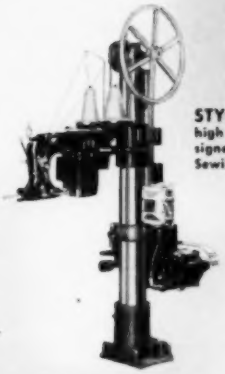
TO MEET MODERN PRODUCTION REQUIREMENTS!



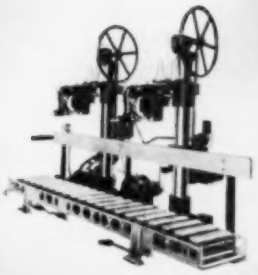
STYLE 21000 H *(Left)*, equipped with 80600 H sewing head, is designed for fast, economical closing of paper bags. Bag is sewed, tape-bound, and tape is cut off neatly at each end of closure. Sewing head and conveyor adjustable vertically.



CLASS 20500 *(above)* machines are heavy duty, high production units for closing medium and heavy weight bags. Available with power-driven horizontal conveyor, inclined conveyor, or both; or with conveyor transmission unit only, for plant production line.



STYLE 20100 H *(left)*, is a heavy duty, high production column type machine designed for use with plant conveyor systems. Sewing head is pedal controlled.



DUPLEX MACHINES *(right)* are designed for closing double bags. The first sewing head closes the inner bag; the second closes either the outer bag alone, or both bags together for extra safety. Also recommended for single closures where continuous operation is a must — operator can instantly switch to other head.

Union Special®

No two jobs are exactly alike—that's why Union Special builds a wide variety of bag closing equipment. In the Union Special line you will find machines for closing all sizes and kinds of bags from small textile or paper bags of one pound, or less, up to the largest jute or multiwall paper bags in use today. And whether your schedule calls for closing just a few bags or for high continuous output, Union Special can supply the equipment to do the work efficiently, economically, dependably! FOR THE BEST IN BAG CLOSING EQUIPMENT, LOOK TO UNION SPECIAL. See your Union Special representative for recommendations, or write.

Ask for Recommendations

UNION SPECIAL MACHINE CO.
447 N. Franklin St., Chicago 10, Ill.

Gentlemen: Without obligating me, please furnish information on bag closing equipment to handle the following production:

Kind of bags used?_____

Filled weight of bag?_____

Material being packed?_____

Maximum bags per minute?_____

Check-weighing required?_____

Conveyor required on Machine?_____

Power: ☐ D.C., ☐ A.C., Volts_____

Phase_____ Cycles_____

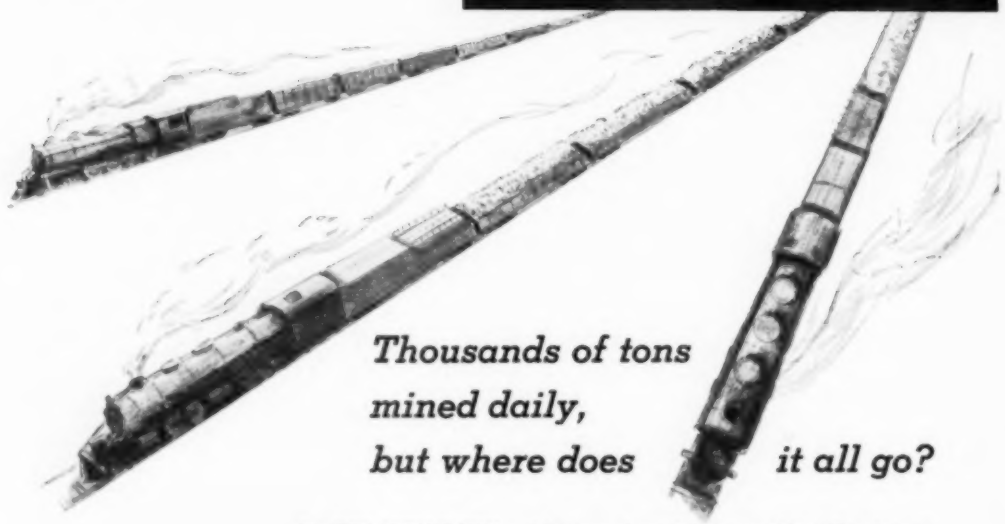
Name_____

Company_____

Address_____

MACHINE COMPANY
447 North Franklin St., Chicago 10, Illinois

Sulphur



Thousands of tons mined daily, but where does it all go?

LOOK AROUND YOU and let your glance fall on any object. The chances are 1000 to 1 that sulphur played an important role in its manufacture, either as a component part of the finished product or as a processing element.

Take, for example, the very magazine you are reading. If it's average size it weighs about 1 pound. Made largely of sulphite pulp it required about 0.1 pounds of sulphur in its manufacture.

Multiply this 0.1 pounds of sulphur by the thousands of magazines turned out every day and you'll get some idea of the tremendous tonnage of sulphur required for this *single* division of industry . . . the sulphite pulp manufacture.

Sulphur has long been called One of the Four Pillars of Industry. Today's need emphasizes this fact more than ever. Sulphur producers are making every effort to get maximum production from existing mines and to develop new sources of sulphur as quickly as possible.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

THE EDITOR COMMENTS

THE recent session on "Chemicals in Foods" sponsored by the Manufacturing Chemists' Association in New York, brought out some rather pertinent statements by various authorities. Unlike the Delaney Hearing wherein witnesses are subjected to cross-examination, the Association meeting heard a lot of good talk straight from the shoulder. We recall particularly some of the words of John M. Foulger, M. D., director of the Haskell Laboratory of Industrial Toxicology of E. I. du Pont de Nemours & Co. He pointed out that most of the "cases" reported in Food and Drug Administration annual reports had to do with the sale and use of drugs, and not chemicals ordinarily used or suggested for use in the production, processing or packaging of food. Indeed, Dr. Foulger observed, "One could conclude from them (the five "cases" mentioned in F.D.A. reports) that the present law had resulted in admirable protection, over the last 13 years at least, of the people of the United States."

Commenting on the toxicity of agricultural chemicals to humans, he declared that "the public does not face the hazard of new or unexplained or undiagnosable diseases as the result of repeated intake of small quantities of chemicals which may be used in . . . food."

Instead, the speaker emphasized, there are other reasons for the incidence of newer maladies and other health hazards being blamed by some on the use of agricultural chemicals. The tenseness of the times, he says, has a great deal to do with it. Then, as a final gesture, he pinned much of the responsibility on "those enthusiastic supporters of the cry for new legislation", who, he said, "have tried to stampede sections of the American public by speeches or by magazine articles of doubtful factual accuracy and ridiculous arguments." "The apprehension or the actual fear which such speeches and articles engender can be a much more potent cause of both mental and physical illness than any chemical used in . . . the nation's foodstuffs."

Dr. Foulger has put into words what a large portion of the industry has thought for a long time . . . that the arguments for more and more legislation are falling of their own weight. Every day we hear and read more to support the idea that no further legislation is needed to protect the public. Our hope is that this factual data may reach the ears and minds of those who will make final decisions about further restrictions on such materials.

PLEAS for farmers to purchase their agricultural chemical supplies early are being heard from many quarters outside the realm of manufacturing concerns. Agricultural leaders, particularly in the south, are well acquainted with the bad results of waiting until late in the season to begin laying in supplies of pesticides.

Among these voices being heard of late, is that of W. C. Nettles, leader of Clemson Agricultural College extension work in entomology and plant disease. "The period between growing seasons is usually the low-priced period for pesticides," he declared recently. "Individual farmers will have to make their own decisions, but they may find that they will save money by buying a portion of their needs now rather than next summer when the demand could be greater, especially if insect conditions increase the demand."

Mr. Nettles thus puts into different words what the industry, both pesticide and fertilizer, has been saying for a number of years. "Buy early, and be assured of supplies when you need them," is a sensible slogan.

With the USDA and other agencies all pointing to record production in 1952, there is bound to be an unusually heavy demand for fertilizers to increase yield, and for pesticides to protect the plants from insects and disease. As we've said before, "Buy Early" makes sense.

Trends in

PRODUCT LIABILITY

THE appraisal and assessment of its potential liability arising from the manufacture and sale of its products, traditionally has been one of the most fundamental requisites of sound management, particularly in the chemical industry. The value of the appraisal of this potential liability is, of necessity, dependent upon the degree of stability and certainty which exists in the applicable law. The field of product liability consists of an intricate system of interrelated legal principles, some of which have been legislated, but the majority of which have been gradually developed over a long period of time by a few landmark and hundreds of satellite court decisions.

The prevailing stability in the field of product liability law was abruptly shattered by the decision of the Supreme Court of Arkansas in 1949 in the case of *Chapman Chemical Co. v Taylor*.[1] In this decision, the court, in effect, cast aside the theretofore generally accepted rule of "due care," under which a person was legally responsible for damage only if he had failed to exercise due care, as measured by the hypothetical "prudent man." In lieu of this rule, the court imposed on the person an "absolute liability" approaching that of an insurer of the safety of his product, regardless of the degree of care exercised in its manufacture and sale.

The significance of this case was undoubtedly increased by the fact that it involved a rather new product, 2,4-D, which was typical of a rapidly expanding group of agricultural and industrial chemicals. Although the legal reasoning by which the court arrived at its decision was not clear, the resultant rule of strict or absolute liability was not in doubt.[2] Since this decision represented a substantial departure from previously existing judicial concepts, but nevertheless one which appeared to accord with a somewhat expanding concept of social justification, it appeared probable that this case might ultimately be forged into a formidable weapon to be used in imposing a new standard of liability upon the chemical manufacturer. Its immediate effect was to introduce an element of confusion which defied responsible appraisal in the determination of product liability.

It is this background which increased the significance of another series of cases which arose at a little later date, and which were finally adjudicated during 1951. In these cases, which will be jointly referred to as *Walton v Sherwin-Williams Co.*,[3] the rationale of the *Taylor* case was re-examined and appraised at the appellate level. Again the forum was in Arkansas, but the court was the United States Court of Appeals for the Eighth Circuit rather than the Supreme Court of Arkansas.

When the *Walton* case came up for appellate decision, there was occasion for concern that the dubious rule of strict liability applied in the *Taylor* case would be dispositive. The facts in the two cases were substantially similar and the federal court in Arkansas deciding *Walton* was bound to follow the substantive law as declared by the state courts of that jurisdiction. The law of Arkansas represented by *Chapman Chemical Co. v Taylor* was not circumscribed within recognizable boundaries. However, the rule of the *Taylor* case was not applied and the decision which emerged from the *Walton* litigation reasserted the traditional and established concepts of product liability law from which *Taylor* was a decisive departure.

It is the plan of this article to evaluate the legal and practical

1. 222 S. W. (2d) 820 (Ark., 1949)

2. That the *Taylor* case squarely stands for the broad proposition of strict liability might be disputed on principle. It must be recognized that the court on appeal was faced with the correctness of a jury instruction by the trial court which dictated a verdict adverse to the manufacturer if the product involved had not been pre-tested for drifting propensities. Essentially, this is an application of the "negligence per se" doctrine rather than of traditional "strict or absolute liability." However, those concerned with the actual effect of the decision are apt to find little comfort in such an analysis. In the first place, the decision imposed strict liability; secondly, the court in its opinion stated that it was applying the rule of strict liability; thirdly, the principal decision which the court used as precedent was a strict liability decision, Luthringer v Moore, *infra* note 7.

3. 191 F. (2d) 277 (Ark., 1951)

by

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implications of the *Taylor* case and then to analyze the recent *Walton* case in an effort to determine its impact on *Taylor* and the future course of product liability law. The growth and expansion of new chemical products in recent years and the concomitant importance of product liability makes such an examination both desirable and necessary.

Legal and Practical Implications of the Taylor Case

THE facts involved in the *Taylor* litigation were these: A farmer used a 2,4-D dust in spraying his rice crop from an airplane. Particles of the dust drifted and settled upon a cotton crop about three-fourths of a mile from the rice crop being treated. The cotton crop was damaged and the owner sued the rice farmer in an Arkansas court. The rice farmer then filed a cross-complaint against the Chapman Chemical Company which was the distributor and sole agent of the manufacturer of the product in Arkansas.[4] The case went on to jury trial with the rice farmer and the chemical company as co-defendants. At the close of the evidence, the trial court instructed the jury that the defendant chemical company was negligent *as a matter of law* if the dust used was (1) an inherently dangerous product liable to damage the property of others, and (2) not tested before distribution to determine whether or not it would damage the property of others. The jury returned a verdict against the chemical company, but in favor of the defendant rice farmer. The chemical company and the plaintiff then appealed.

Widespread legal importance has been attached to the decisions of CHAPMAN CHEMICAL CO. v TAYLOR *and* WALTON v SHERWIN-WILLIAMS COMPANY *as they relate to the liability of manufacturers producing chemical products.*

The significance of the decisions and their importance to chemical manufacturers prompted AGRICULTURAL CHEMICALS *to arrange for a review of these cases for our readers. The authors of the accompanying article are John D. Conner and George A. Burroughs.*

Mr. Conner and Mr. Burroughs are members of the bar of the District of Columbia where they are associated in the practice of law. They have had extensive experience as legal consultants in the chemical field. Their background of practical experience and research in this field has produced a team well qualified to understand and discuss the current trend in product liability decisions.—ED.

On appeal to the Supreme Court of Arkansas, it was urged by the chemical company that the jury instructions of the trial court imposed upon it an insurer's liability since they authorized recovery even though reasonable care had been exercised in manufacturing and marketing the product which caused the damage.[5]

The court affirmed the judgment of the trial court in sustaining recovery against the chemical company and denying recovery against the rice farmer who caused the product to be applied.

What were the legal justifications and practical implications of this decision which, in effect, held a chemical manufacturer absolutely liable for damage arising from the use of his products by others?

The chemical industry has,

4. Although the Chapman Chemical Co. was a distributor, it sold the dust in question as its own product and therefore assumed the role of a manufacturer in legal contemplation. The Chapman Chemical Co.'s objections to the jurisdiction of the court and the propriety of joinder were overruled. The court held that service of process was sufficient under the Arkansas statute providing that any non-resident doing business in Arkansas would be deemed to have appointed the Secretary of State as agent on whom process could be served in any action arising out of the non-resident's doing business within the state. The bringing of the chemical dusts into the state and making tests there was deemed, *inter alia*, to constitute the doing of business by the chemical company. Joinder was held proper under the Uniform Contribution Among Tortfeasors Act.

5. In addition to the procedural objections noted in footnote 4, *supra*, the chemical company contended that the lack of contractural privity between it and the plaintiff barred recovery. This defense was dismissed by the court upon the theories underlying MacPherson v Buick, 111 N.E. 1050 (N.Y., 1916), and Carter v Yardley, 64 N.E. (2d) 693 (Mass., 1946).

like other industries, had its share in claims arising from damages caused by its products. For over a century, various segments of the industry have had their product responsibility spelled out by the courts. Litigation has involved drugs, cosmetics, fertilizers, pesticides, and all types of industrial and household chemicals. Quite naturally, the inherent properties of many products produce unintended results despite the utmost precautions by industry. In all of these cases, during this long span of time, an injured party's right to recovery was premised on the failure of the one placing the product on the market, either as a manufacturer, wholesaler, or retailer, to exercise due care in manufacturing or selling it. Unless the seller was negligent there could be no recovery under a tort theory.[6] And, yet, the court in the *Taylor* case brushed aside the impressive weight of judicial authority adhering to the traditional tort theory and, in substance, legislated a new and confused concept in the law of product liability.[7]

However this may be, legal dissection of a court decision means little to the average executive whose major concern is generally the practical effect which it has upon the future conduct of his business. Less important is the fact that a particular decision breaks down an existing certainty of law and destroys the lawyer's quest for intellectual repose.

Although *Chapman Chemical Co. v Taylor* was concerned with the liability of a pesticide manufacturer for damage caused by aerial spraying operations, the scope of the decision could well encompass all types of chemical products. It is important, therefore, that the chemical manufacturer bear in mind the practical implications of the decision.

Mfr. Always Liable?

FIRST, absolute liability in product damage claims would mean that the manufacturer would be potentially subject to liability irrespective of the care with which he selects the ingredients incorporated in his finished product, or the precautions which he takes during the manufacturing process to assure that the product as placed on the market is safe for its intended use, or the care which he exercises in labeling his product with appropriate directions for use and warnings against misuse, or the expense undertaken in carrying out public educational programs on the methods in which his product can be safely used. Once it were established that the product caused damage, liability would ensue despite the thoroughness of these undertakings. The manufacturer would be liable merely because he is the manufacturer.

If the product is "inherently dangerous," as are most chemicals in legal contemplation, it would not be a defense to a product liability claim that some third party in the chain of distribution or use was careless in using the product or failed to heed directions. For example, in the case of the aerially-applied pesticide involved in the *Taylor* case, the farmer could have carelessly selected an applicator or the applicator could have carelessly conducted the spraying operations, yet the law enunciated in that decision would hold the manufacturer liable, virtually as an insurer.[8]

Second, the force of the probability or improbability of a product's causing a particular type of damage is an irrelevant, or at best impotent, consideration where absolute liability is the judicial standard for determining the outcome of specific cases. For recourse to the familiar, take the product in the *Taylor* case. As the dissenting opinion pointed out, it is commonly recognized that 2,4-D is harmless to narrow-leaved plants. Suppose, for example, that there is in the world one narrow-leaved plant that the dust would injure. Under the reasoning of the *Taylor* case, the manufacturer would be liable for failing to assure the safety of his product on that particular plant, even though it may have taken every conceivable precaution to assure its safety with ten thousand other species.

Consider the case of a cosmetic which causes injury to an allergic consumer. It is established that the particular allergism involved is encountered in only one out of a thousand cases. Under the *Taylor* case, the manufacturer of the cosmetic would be liable, yet we know that the law of negligence would dictate a different result since such resulting injury is generally held unforeseeable.[9]

The unreasonable burden which the adoption in the law of the *Taylor* principle would impose on the chemical manufacturer is self-evident. Spurious claims are serious enough under the present state of the law—under strict liability, Pandora's Box would be opened. Every injury would represent a potential damage claim against the manufacturer. Carelessness

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6. In certain cases, recovery is allowed under a breach of warranty theory which is essentially a form of absolute liability. Warranties were not involved in the *Taylor* case.

7. See E. I. Du Pont de Nemours v Baridon, 73 . (2d) 26 (Iowa, 1954) where an appellate court reversed a judgment on the ground of error in the trial court's instructions imposing an insurer's liability on a fungicide manufacturer.

The court in placing an insurer's responsibility on the manufacturer in the *Taylor* case pitched this part of the decision on an earlier California case, Luthringer v Moore, 190 P. (2d) 1 (Cal., 1948), which imposed absolute liability on a pest control operator for personal injuries resulting fr the inhalation of hydrocyanic acid which the operator was using and which escaped to adjoining premises. To the critical observer it is clear that the *Moore* and *Taylor* cases were factually dissimilar and that each fell within separate and distinct categories of legal principles. The *Moore* case involved the rights of adjacent landowners, not the rights of a buyer of a product against the seller. Parradoxically the rice farmer in the *Taylor* case was the direct counterpart of the pest control operator in the *Moore* case, but the court held the rice farmer to the traditional tort standard of due care. If the manufacturer in the *Taylor* case had a counterpart in the *Moore* litigation it would have been the manufacturer of the hydrocyanic acid—not the operator.

Aerial crop spraying with insecticides has been involved in S. A. Gerrard Co. v Fricker, 27 P. (2d) 678 (Ariz., 1933); The Hammond Ranch Corp. v Dodson, 136 S. W. (2d) 484 (Ark., 1940); Lundberg v Bolon, 194 P. (2d) 454 (Ariz., 1948); Lenk v Spezia, 213 P. (2d) 47 (Cal., 1949); Jeanes v Holtz, 211 P. (2d) 925 (Cal., 1949); Burns v Vaughn, 224 S.W. (2d) 365 (Ark., 1949); Kennedy v Clayton, 227 S.W. (2d) 934 (Ark., 1950), McKennon v Jones, 244 S.W. (2d) 128 (Ark., 1951). It is significant to note that there was no suggestion in any of these cases that the person causing the spray or dust to be used should be held absolutely liable for damage caused by the drifting of the chemical from the place of release. Recovery was allowed only where it was found that the landowner or the applicator had failed to exercise reasonable care in planning and conducting the operation.

8. Of course, the farmer and applicator would also be liable in such circumstances. See cases cited in note 7, *supra*.

9. Bennett v Pilot Products Co., 235 P. (2d) 525 (Utah, 1951). Here the court said: "We are sympathetic with appellant and her misfortune, but cannot require the merchant to assume the role of absolute insurer against physiological idiosyncrasy. To do so also would invest the elusive ordinary prudent man with a quality of foreseeability that would take him out of character completely. Every substance, including food, which is daily consumed by the public, occasionally becomes anathema to him peculiarly allergic to it. To require insurability against such an unforeseeable happenstance would weaken the structure of common sense, as well as present an unreasonable risk on the channels of trade."

and improper handling of chemical products by others would be promoted.

It is because of this background that the recent decision in *Walton v Sherwin-Williams Co.* is of great importance.

Significance of S-W Case

THE *Walton* case was factually similar to the *Taylor* case. Rice farmers used a 2,4-D preparation in spraying their rice crops from an airplane. The weed killer settled upon the cotton crops of neighboring cotton growers and caused substantial damage. Unlike the *Taylor* case where the 2,4-D was used in dust form, the 2,4-D was applied in an oil solution as a liquid spray. The cotton farmers brought actions for the recovery of their damages against the manufacturer of the product, without including any of the persons who did the spraying or who caused it to be done.[10]

Plaintiffs sued on a dual theory of recovery. On one hand, they contended that the 2,4-D was an "inherently dangerous substance" subjecting the defendant manufacturer to strict liability in accordance with the rule laid down in *Chapman Chemical Co. v Taylor.* They also contended that the defendant was negligent in failing (1) to make adequate tests to determine the drifting properties of its product, and, (2) to give adequate warnings of the properties of the product and of the dangers to be anticipated from its use in an area where rice crops were being cultivated in the vicinity of crops of cotton.

In bar of the suits, the defendant contended that the product could be safely used in an area of mixed crops provided that the rice farmers and the airplane pilot used due care in its application and observed certain control factors, such as wind direction and drift and the height at which the airplane was operated.

10. The nine separate actions were consolidated for trial. Two wholesale and resale distributors of the product were originally included as defendants but on the trial it appeared to the court that no case was made out for the jury against them and they were peremptorily dismissed.

At the conclusion of the evidence, the trial court submitted special interrogatories to the jury.[11] These were answered as follows:

(1) The damage to the crops was caused by the product,

(2) The product was not "inherently dangerous" when applied in an oil solution from an aircraft in mixed crop areas,

(3) The defendant manufacturer did not fail to make adequate tests or to give adequate instructions and warnings as to the properties and qualities of the product, as to how it should be prepared and used so as to avoid the probability of damage to broad leafed crops growing in the vicinity of rice fields, and,

(4) Either the rice farmers or the airplane pilot knew or should have known that the product would damage cotton if it came in contact with it, and yet was negligent in preparing or using it.[12]

Upon the basis of these findings, the court entered judgment for the defendant and the plaintiffs appealed on various grounds. Primarily, plaintiffs relied on *Chapman Chemical Co. v Taylor,* contending that upon the authority of this decision the manufacturer should be held to the standard of strict liability.

The appellate court cast more than a polite leer at the *Taylor* case, however, and in affirming the judgment for the defendant, held that the cases were distinguishable. Approval was given to the opinion of the trial court which stated:

"Conceding that the holding in the Chapman case is to the effect that 2,4-D in dust form is so inherently dangerous when sprayed from an airplane as to impose 'absolute liability' on the mamufacturer, it does not follow that 2,4-D in liquid form is such an inherently dangerous product. It is to be borne in mind in this connection that the evidence in this case shows that 2,4-D standing alone has no peculiar drifting qualities; such qualities depend upon the carrier which is employed. In the Chapman case that carrier was a powder in this case it was a liquid."

11. Special verdicts and interrogatories are permitted in the court's discretion under Rule 49(a) of the Federal Rules of Civil Procedure. This form of verdict enables an expeditious determination of complex facts by the jury, leaving the application of the law to such facts to the court. It also serves to minimize bias and prejudice from playing a part in the jury verdict.

12. Other instructions and interrogatories were submitted which are not here relevant. On the issue of damages the jury placed the cash value of the plaintiffs' crops at $106,352,88. See, 10 F.R.D. 293 for a complete report of the instructions and interrogatories

It is essential to appreciate that the *Taylor* case was not directly overruled. This the federal court had no authority to do. The distinction invoked by the court was that in the *Taylor* case the product involved was determined to be "inherently dangerous," i.e., a product which for its intended use necessarily involves a risk of serious harm to the property of others regardless of the degree of care which is observed in its preparation and use. In the *Walton* case, the product involved was found not to be "inherently dangerous" in this legal sense.

The significance of the *Walton* case lies in the braking influence which it undoubtedly will exert on any further extension of the concept of strict liability in chemical-products liability claims. Essentially, it is a return to the established law of liability that in the absence of a warranty, a manufacturer is liable for damage arising from the use of his products only where the damage is traceable to some negligent conduct or inaction on his part. The boundaries marked by *Walton* are crystal clear. If a chemical can be used safely by observing certain precautions in its use, and these precautions are known to the persons using it, then the manufacturer cannot be held to "strict liability."

Present Liability Law

THE chemical manufacturer has a basic responsibility to the purchasing public to assure that the products which he manufactures and places on the market for sale are safe and efficacious for the purposes for which they are sold. Included within this responsibility is the duty to exercise due care in testing the product prior to distribution to assure that it is safe when used as directed and to employ adequate control measures throughout the entire period of manufacture to avoid the risk

(*Turn to page* 113)

Factors Influencing the Efficiency of Fertilizer Conditioners*

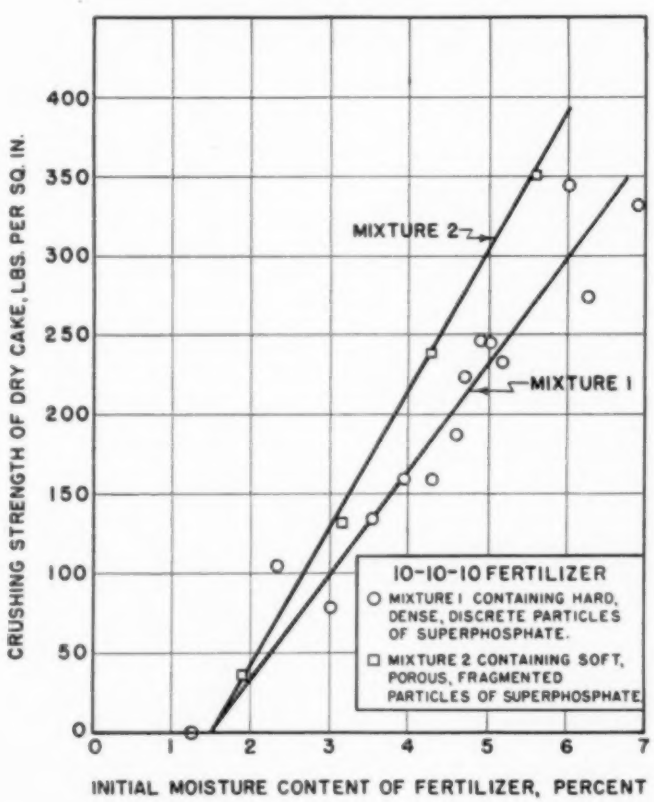
PHYSICAL condition of fertilizers is of primary importance to both the consumer and the manufacturer. Poor condition contributes to customer dissatisfaction and frequently leads to the return of the fertilizer to the manufacturer. Lumpy fertilizer is difficult to apply uniformly in the field and on this account may impair the efficiency of the fertilizer in promoting crop growth. Reconditioning of rejected fertilizer disrupts factory routine and involves additional transportation, handling and bagging costs.

The damp, sticky condition resulting from the absorption of moisture by fertilizer materials and mixtures has been widely investigated (1, 10, 11, 14, 20) and may be extensively controlled by storing the fertilizer in moisture-resistant bags (4, 17,). Poor condition involving the caking of finely divided materials (6, 7, 12, 13, 18) can not be controlled effectively solely by the use of a moisture-resistant package. Materials commonly used to alleviate this type of caking include oil-seed meals, hull meals, and other natural organic residues, organic and inorganic industrial by-products, and natural inorganic materials such as clays, diatomaceous earth and vermiculite.

Considerable conditioning effect was afforded formerly by the use of several hundred pounds of organic ammoniates per ton of relatively low analysis mixtures, but present-day high analysis mixtures have room in the formula for scarcely more than 100 pounds of conditioning agent. This low rate of use has met with only varied success in commercial practice. Results obtained with the same conditioning agent are often very erratic so that there is need for an evaluation of the factors affecting their efficiency.

In a previous paper (8), describing some of the physical and chemical properties of conditioners,

Chart 1



(* Presented before the Division of Fertilizer Chemistry at the 120th national meeting of the American Chemical Society, New York City, September 3-7, 1951.)

the materials studied varied widely with respect to such characteristics as moisture content, moisture absorbing capacity, apparent density, and particle size.

The present paper reports the results obtained in a study of the effect of these conditioners on the caking tendency of mixed fertilizer, as influenced by some of the properties of both the conditioner and the fertilizer mixture. Approximately 1400 laboratory caking tests were carried out on mixed fertilizers, with and without the inclusion in the mixture of some 80 different materials commonly used or proposed for use as conditioning agents.

Procedure

A 10-10-10 grade of fertilizer, formulated without conditioner was used as a reference mixture in comparative caking tests. It consisted of ammonium sulfate 520, ammonium nitrate 125, nitrogen solution (40.6 % N) 130, superphosphate 806, triple superphosphate 81, and potassium chloride 338 pounds per ton. Nitrogen in the mixture consisted of 17.5% nitrate nitrogen and 82.5% ammonia nitrogen. The physiological acidity was equivalent to 739 pounds of calcium carbonate per ton. Except as otherwise noted in this paper, the particle size of the solid ingredients of the mixture was uniform between 0.246 and 0.279 mm., or that passing a 50- and retained on a 80-mesh sieve [1].

[1] The term "mesh" as used in this paper refers to the number of mesh per inch and the size of screen opening in millimeters as follows: 10 = 1.65, 20 = .833, 30 = .603, 40 = .381, 50 = .279, 60 = .246, 80 = .175, 100 = .147, 150 = .104, 200 = .074, and 325 mesh = .043 mm.

Table I

Effect of Particle Size of Conditioner on Caking of 10-10-10 Mixed Fertilizer [1]

Conditioner			Crushing Strength of Cake[2]	Reduction in Crushing Strength	
Name	Mesh Size	Apparent Density			
None	.....	.....	240 ±14	0	0
Vermiculite	50–60	8	130 ±15	110	46 ±6
	100–150	9	144 ±19	96	40 ±8
	200	7	160 ±16	80	33 ±7
Ground bark	50–60	18	167 ±24	73	31 ±10
	100–150	18	145 ±10	95	40 ±4
	200	15	142 ±9	98	41 ±4
Cocoa shell meal	50–60	29	133 ±7	107	45 ±3
	100–150	28	118 ±13	122	51 ±4
	200	23	183 ±7	57	24 ±3
Clay (montmorillonite)	50–60	36	148 ±11	92	38 ±5
	100–150	42	138 ±8	102	43 ±3
	200	29	124 ±9	116	48 ±4

[1] 95% 10-10-10 mixed fertilizer, 5% conditioner moisture content of conditioned mixture, 4.3%.
[2] The ± value indicates 5% fiducial limits of the mean for 4 replications of the test.

Chart 2

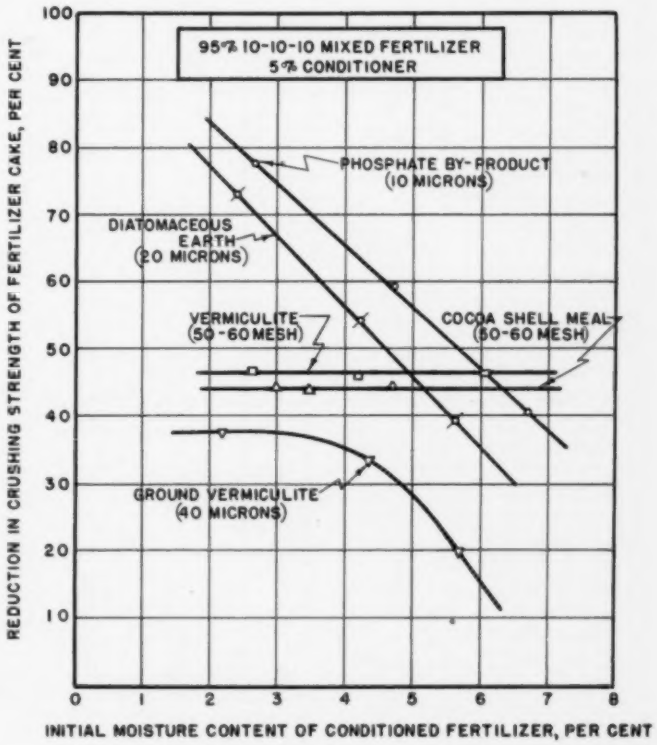


Table II

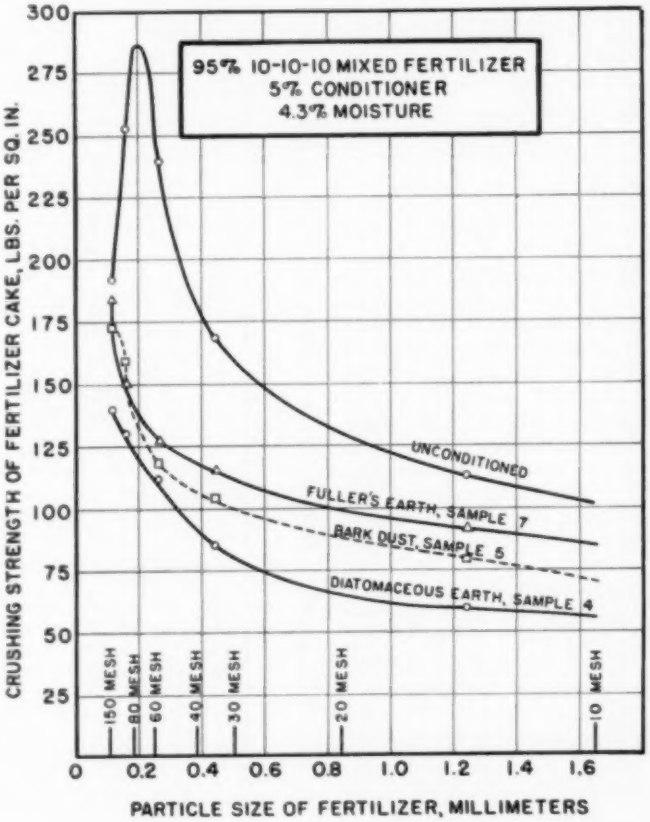
Evaluation of Conditioners [a]

Sample No.	Material Name	Material Mean Particle Size	Reduction in Crushing Strength of Fertilizer Cake
1	Phosphate by-product[b]	10	63 ±2
2	Fuller's earth[c]	55	61 ±3
3	Expanded perlite	30	61 ±7
4	Diatomaceous earth	25	53 ±3
5	Bark products[d]	55	51 ±3
6	Clay[e]	50	49 ±3
7	Fuller's earth[c]	2	47 ±2
8	Fuller's earth[c]	2	44 ±5
9	Carbon gas black	1	43 ±6
10	Bark products[d]	20	41 ±4
11	Cottonseed hull flour	75	39 ±5
12	Vermiculite[f]	120	35 ±3
13	Vermiculite[f]	40	34 ±6
14	Carbon flue dust	20	33 ±5
15	Clay[e]	10	27 ±4
16	Sawdust, pine	70	24 ±6
17	Clay[e]	30	25 ±9
18	Cocoa shell meal	40	24 ±6
19	Clay[e]	35	17 ±4
20	Resin[g]	65	17 ±9
21	Lignin[h]	10	17 ±5
22	Clay[e]	40	13 ±9
23	Lignin[h]	40	8 ±7
24	Clay[e]	40	7 ±4
25	Talc	20	5 ±8
26	Graphite flakes	200	5 ±6
27	Graphite powder	15	2 ±8
28	Phosphate rock	15	1 ±6
29	Igneous rock dust	40	-22 ±17
30	Expanded perlite		83 ±3
31	Vermiculite[f]		46 ±7
32	Corn cobs		46 ±1
33	Cocoa shell meal		44 ±4
34	Soybean meal		41 ±5
35	Peat[i]		39 ±5
36	Clay[e]		38 ±6
37	Cork waste		38 ±3
38	Peanut hull meal		38 ±3
39	Peat[i]		38 ±5
40	Tobacco stems		33 ±4
41	Bark products[d]		31 ±10
42	Rice hull meal		30 ±3
43	Tung hull meal		30 ±3
44	Peat[i]		28 ±3
45	Spent fuller's earth[b]		28 ±4
46	Cottonseed meal		27 ±4
47	Ureaform[j]		26 ±7
48	Furfural residue[m]		24 ±3
49	Dried blood		20 ±5
50	Castor pomace		20 ±4
51	Olive pomace		17 ±2
52	Poultry litter[o]		14 ±2
53	Sawdust, pine		12 ±2
54	Sand		0 ±7

Footnotes

[a] 95% 50 to 60 mesh 10-10-10 mixed fertilizer, 5% conditioner; initial moisture content of conditioned mixture, 4.3%. [b] Sample 1 is a dried sludge obtained as a by-product in the manufacture of sodium phosphates from wet-process phosphoric acid. [c] Samples 2, 7, and 8 are fuller's earths from different sources. [d] Sample 5 is a ground product consisting of cork and lignin fiber from Douglas fir bark; sample 10 is cork-flake from the same source ground in the laboratory; sample 41 is the unground flake. [e] Samples 6 and 36 are montmorillonitic clays. Samples 15, 22, 24 are kaolinitic clays from different sources, sample 22 having been treated with 0.5% aluminum stearate; samples 17 and 19 are pyrophyllitic clays from different sources. [f] Samples 12, 13, and 31 are expanded products, samples 12 and 13 having been ground in the laboratory; sample 31 is screened unground material. [g] Sample 20 is a hard, friable, high-melting resin derived from resin. [h] Samples 21 and 23 are by-products of the pulp and paper industry, the former from the soda wood-pulping process and the latter from the sulfite wood pulping process. [i] Samples 30 to 54 were screened materials having a particle size equivalent to that of the other fertilizer ingredients, (50-60 mesh). [j] Samples 35, 39, and 44 are partially dried commercial products; sample 35 is a reed and sedge peat somewhat more decomposed than the other two; sample 39 has a moss-like structure, and sample 44 is a reed and sedge peat having a dense granular structure. [k] Sample 45 is a dried residue from the use of fuller's earth as an absorbent in the purification and clarification steps of petroleum refining. [l] Sample 47 is an experimentally produced urea-formaldehyde reaction product. [m] Sample 48 is the partially dried residue from the production of furfural by the steam digestion of a mixture of ground corn cobs, rice hulls, and oat hulls. [o] Sample 52 is a dried sawdust litter from the poultry industry.

Chart 3



Incorporation of different conditioning agents in this 10-10-10 mixture did not change the plant nutrient ratio except in a few cases where the conditioner also contained plant nutrient. The addition of each 100 pounds of inert conditioner per 2000 pounds of conditioned mixture decreased the percentage of each nutrient in the mixture by 0.5-unit increments so that, with 400 pounds of conditioner, the grade of the mixture was 8-8-8.

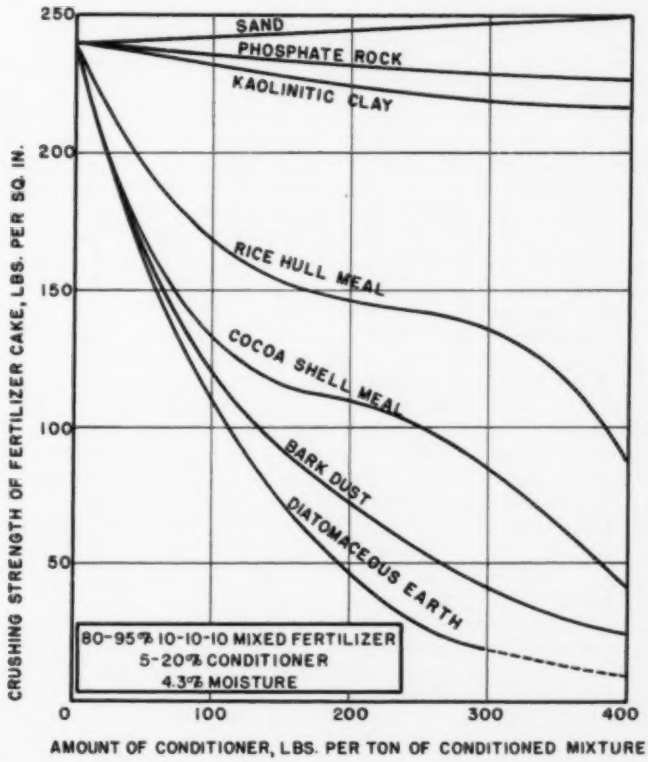
Mixing and ammoniation of freshly-prepared, 400-gram batches were carried out in a laboratory rotary mixer and the initial moisture content of the mixture was adjusted by the addition of water at the same time.

Following ammoniation, the mixture was allowed to stand at room temperature in an air-tight container. At the end of 24 hours its free-moisture content was determined by the air-flow method (9) and the caking tendency was then measured by a modification of the method of Adams and Ross (2, 3) which determines the crushing strength of briquets formed under mechanical pressure in a caking bomb. Except where otherwise noted, tests were made in replicates of five. A sufficient amount of mixture was placed in each bomb to give a thickness of cake slightly greater than one inch. The pressure was adjusted to 12 pounds per square inch (p.s.i.) and the bombs were stored for one week at a temperature of 30° C. The resulting fertilizer briquet was then removed, dried in an air oven for 72 hours at 50° C., and placed in a desiccator to cool. This drying procedure reduced the moisture content of the cake to less than 0.5 % and insured the occurrence of maximum cementation under these conditions. The cake, two inches in diameter, was then sanded to a uniform thickness of one inch and its crushing strength determined.

The bombs used in this study were carefully selected for their mechanical reliability, and were inspected and calibrated at frequent intervals. Uniformity in size and shape of briquets was obtained by (a) using a uniform quantity of test material in each bomb, (b) leveling the material before applying pressure, (c) providing a non-absorbent, thin, paper liner in the bomb to prevent sticking of the fertilizer to the metal wall, (d) slight sanding of the top surface of the briquet to produce a tight, circular, cylindrical cake with a height of 1 inch, and (e) careful handling of the briquet to avoid crumbling of its sharp, fragile edges.

The reliability of the results can be judged from the 5 % fiducial limit (19) appended to each mean value of replicate tests by a ± sign. Subject to the usual assumptions, the odds are 19 to 1 that the true mean lies between the two limiting values. Agreement among results of replicate tests was reasonably satisfactory except in a few cases of unavoidable segregation of the conditioner owing to differences in apparent density and particle size. The apparent density of the different conditioners varied from 4 to 86 pounds per cubic foot (8) and that of the 10-10-10 reference mixture was 55 pounds per cubic foot. Uniform mixing of 50- to 50-mesh particles of fertilizer with larger particles of light-weight conditioner could not be obtained and poor agreement among results of replicate tests was accompanied by spotted and striated appearance of the cake. Agreement among replicate results and uniform appearance of the cake were obtained when the particle size of the conditioner was approximately the same or less than that of the fertilizer. Coarse conditioners were therefore screened to provide test samples having the same particle size range as the fertilizer (50-60-mesh).

Chart 4



Less than 50-mesh conditioners were used as received and frequently contained material finer than 1 micron.

Superphosphate

CAKING tests were made on two 10-10-10 mixtures which were identical except for the superphosphate used in their formulation. The superphosphate in mixture 1 consisted of hard, dense, discrete, 50 to 60-mesh particles, obtained by screen-separation in which the fines and over-size were rejected. That in mixture 2 consisted of soft, porous, 50 to 60-mesh particles including some fragmented material having freshly exposed surfaces as a result of crushing the oversize and returning it to the screens. The two superphosphates were similar with respect to P_2O_5 and free acid content.

The results of the caking tests on these two mixtures are given in Figure 1. Aside from the rapid increase in crushing strength of cake with increase in initial moisture content of the mixture, it is apparent that the soft, porous, fragmented particles of superphosphate in mixture 2 are responsible for producing a harder cake than the hard, dense, discrete particles of superphosphate in mixture 1. The crushing strength of the mixture-1 cake is 22 % less than for the mixture-2 cake. This influence of the physical properties of the two superphosphates on the caking tendency of the mixture emphasizes the importance of providing uniform stocks of material for use in comparative caking tests. Mixture 2 (Figure 1), containing the type of superphosphate most widely used at present in commercial practice, was selected for use as the reference mixture in the present study.

Moisture

THE dependence of crushing strength of unconditioned fertilizer cakes on the initial moisture content of the mixture is also depicted in Figure 1. Below an initial moisture content of 1.5 % there is no tendency for the mixture to cake under the mechanical pressure applied in the bomb. At higher initial free moisture contents, caking takes place in the bomb. This action, coupled with the cementation which occurs during the subsequent drying of the cake, causes an extremely rapid increase in crushing strength with increase in initial moisture content. For mixture 2, the crushing strength of the cake increases approximately 88 p.s.i. for an increase of 1 % in initial moisture content. At 4.3 % initial moisture content of the fertilizer, the crushing strength of cake is 240 p.s.i. A decrease in moisture from 4.3 to 3.3 % reduces the crushing strength by 88 p.s.i. or 37 %.

TABLE III
Conditioning Effect of Magnesium Oxide

Ingredient of Mixture	Grade 10-10-10	10-20-10	6-12-12	3-12-12
	Fertilizer Formula, lbs./ton			
Superphosphate	753	.....	1037	1200
Triple superphosphate	104	857	75	.....
Ammonium sulfate	520	520	328	.....
Ammonium nitrate	125	125	.....	.....
Nitrogen Solution 2-A	130	130	130	150
Potassium chloride	338	338	400	400
MgO and sand	30	30	30	250

Caking Tendency

MgO	Sand	Crushing Strength of Cake[1]			
lbs./ton		lbs./ sq. in.			
0	30	288 ±19	165 ±17	190 ±23	143 ±25
10	20	128 ±14	139 ±9	147 ±11	36 ±8
20	10	75 ±3	115 ±11	88 ±12	50 ±14
30	0	71 ±8	68 ±18	37 ±5	89 ±7

Moisture Analysis

MgO	Sand	Moisture Content 24 Hrs. After Mixing			
lbs./ton		percent			
0	30	4.7	5.0	4.9	5.3
10	20	5.0	4.8	4.6	5.3
20	10	4.6	4.0	4.7	5.1
30	0	4.2	3.7	4.0	5.0

[1] The values given are mean averages for 5 replications of the caking test. The ± value is the 5% fiducial limit indicating that on continued repetition of the test the odds are 19 to 1 that the result will lie between the two limiting values.

Particle Sizes

SOME of the conditioning agents, such as vermiculite, ground bark, cocoa shell meal, and montmorillonitic clay were amenable to separation into various size fractions which were used in determining the effect of particle size of the conditioner on the crushing strength of the fertilizer cake. Three size fractions of the conditioner; namely, 50-60, 100-150, and minus 200 mesh; were used at the rate of 100 pounds per ton of conditioned mixtures, the other ingredients of which had a particle-size range of 50-60 mesh.

The results of the caking tests (Table I) show the beneficial effect of these conditioners in reducing the crushing strength of the fertilizer cake but there was no correlation between particle size of the conditioner (column 2) and the percentage reduction in crushing strength of cake (column 6). With vermiculite and cocoa shell meal, the crushing strength of the cake (column 4) tended to increase with a decrease in particle size of the conditioner. The opposite was true with ground bark and montmorillonitic clay. The apparent density (column 3) tended to decrease with increasing fineness of the conditioner, but there appears

to be no correlation between these variations in density and the efficiency of the conditioner.

The results given in Table I suggest that the ability of the finely divided conditioner to coat the surface of the fertilizer particle must be taken into account. If coating is a factor in the efficiency of conditioner, it would be expected that the amount of moisture present at the surface of the fertilizer particle during the mixing operation would affect the efficiency of the finely divided conditioner.

Effect

STANDARD caking tests at various moisture levels were made, using conditioned mixtures containing 5 % of diatomaceous earth, phosphate by-product, ground and unground vermiculite, and cocoa shell meal, respectively. The mean particle size of the diatomaceous earth, phosphate by-product, and ground vermiculite were 20, 10, and 40 microns respectively; that of unground vermiculite and cocoa shell meal, 262 microns (50-60 mesh) which corresponded to the particle size of the fertilizer. Results of the tests (Figure 2) are given as percentage reduction in crushing strength of cake plotted against initial moisture content of the fertilizer. Percentage reduction is based on the curve for mixture 2 in Figure 1.

With cocoa shell meal and unground vermiculite, in which the particle size range was the same as that of the fertilizer, the percentage reduction in crushing strength was independent of the moisture content of the mixture. However, with conditioners of extremely small particle size, *viz.*, diatomaceous earth and phosphate by-product, the percentage reduction in crushing strength was greatest at low initial moisture contents and decreased linearly as the moisture content increased.

This difference in the behavior of the relatively coarse and finely divided conditioning agents is attributed to the greater potential ability of the finely divided materials adequately to coat the individual fertilizer particles. This is indicated by the decreasing effectiveness of 10-micron phosphate by-product, 20-micron diatomaceous earth, and 40-micron ground vermiculite in reducing the crushing strength of the fertilizer cake, and with the exception of 40-micron vermiculite by their superiority over 50-60 mesh cocoa shell meal and vermiculite at low moisture contents. Only 44% of the 40-micron vermiculite adhered to the surface of the relatively dry fertilizer particles (2.7% moisture) in comparison to 78% in the case of the diatomaceous earth. The anomalous behavior of the 40-micron vermiculite in comparison to the 50-60 mesh material is not readily explainable.

The loss in effectiveness of the finely divided materials with increasing moisture content of the mixture is attributed to excessive coating of some and inadequate coating of other particles under these conditions. On the other hand, the coating factor is not involved when the particle of inert conditioner is essentially the same size as the other ingredients, as is true of the mixture containing 50 to 60 mesh vermiculite and cocoa shell meal (Figure 2). In this instance, the particles of conditioner merely lie between fertilizer particles to reduce the number of contacts among active ingredients and cushion the mass of fertilizer against mechanical compression.

Accordingly, conditioners may be conveniently classified into two groups, (a) those sufficiently finely divided to act as coating agents and (b) those with coarse particles comparable in particle size to the ordinary mixed fertilizer. The anti-caking efficiency of the materials in the first group decreases as the moisture content of the mixture increases, while that of the materials in the second group is independent, within limits, of the moisture content of the mixture.

In table II the conditioning agents are listed with the relative crushing strengths of the conditioned mixture containing 5% of these conditioners and 43% moisture. Properties of the various materials included in table II have been previously described (8). Relative efficiency of different conditioners is comparable only for equal moisture contents of the fertilizer.

Particle Size

THE effect of particle size of the fertilizer ingredients on the caking tendency of the 10-10-10 reference mixture, with and without conditioning agents, is represented by the curves in Figure 3.

The conditioners were diatomaceous earth, bark dust and fuller's earth used at the rate of 100 pounds per ton of conditioned mixture. Samples of mixture used for caking tests contained 4.3% moisture and were identical except with respect to the type of conditioner used and the particle size of the fertilizer ingredients; namely, 10-20, 30-40, 50-60, 80-100, and 100-150 mesh.

The crushing strength of cake in the unconditioned mixture (Figure 3) rises rapidly with decrease in size of the fertilizer particle and reaches a maximum at approximately 0.175 mm. (80 mesh). The sharp decline in crushing strength of cake with decrease in size of particle below 80 mesh is attributed to the observed formation of agglomerates or granules during the mixing and ammoniation operation. Increasing the particle size of the unconditioned mixture from 0.25 mm. (60 mesh) to 1.65 mm. (10 mesh) caused a reduction in crushing strength of 163 p.s.i. or 62%.

The positions of the curves in Figure 3 show that, of the three conditioning agents compared in this series of tests, diatomaceous earth gave the best conditioning effect, followed in order by bark dust and fuller's earth. This is in agreement with the results of Ross et al (16) who found that diatomaceous earth was one of the most effective coating agents for granular ammonium nitrate. The absence of a break in the curves representing the conditioned mixtures indicated that little agglomeration of fertilizer particles took place during ammoniation and mixing of the finely-divided fertilizer.

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Low Gallonage

Fungicide Sprays

by

J. D. Wilson*

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WHEN used in connection with spray applications, "Low-gallonage" is a relative term. In spraying forage crops for insect control it may mean the use of 2 to 10 gallons of spray mixture per acre. In spraying apples it may mean the use of 2 to 4 gallons per tree. Just what it means in spraying an acre of vegetables for disease control is more indefinite at present, but it will probably come to mean the use of 20 to 40 gallons per acre, or somewhere between a 4X and a 10X concentration of the usual spray mixture formulation. The symbol "X", used in connection with the concentration of the spray mixture, in turn indicates the number of times more concentrated is the formulation being used, as compared to that which would be used with the usual gallonage. For instance, if regular practice involved the use of 150 gallons of a 2-100 formula per acre, a 5X concentration would represent the use of 30 gallons of a 10-100 formulation.

Fungicide Problems

THE spraying of row-crops with our present-day fungicides for the control of foliage diseases may well prove to be the most difficult operation yet encountered in the use of low-gallonage or "concentrate" sprays. Virtually all of the fungicides now used on vegetables are in the form of low-solubility powders. These must be applied as suspensions in water, thus creating a distinct hazard of nozzle clogging if one tries to use apertures small enough to reduce the rate of application to about 30 gallons per acre without reducing the number of nozzles or increasing the forward speed of the sprayer at all.

Difficulty has been encountered also in mounting a single nozzle in a small air blast so that the liquid particles will be distributed evenly over the foliage area to be covered by that air blast. Since it is desirable to reduce the number of nozzles commonly used, and since it seems impractical to use single nozzles in small air blasts arranged in the form of a horizontal boom, the most promising recourse should be the use of a single, large air blast in which only comparatively few nozzles are mounted. This air blast might be made to revolve, or oscillate, or it might be held in a fixed position, and the swath or area to be treated may be to the rear or at the side of the applicator, depending on the job to be done.

The so-called air-blast machines should probably represent the use of 10,000 to 20,000 cubic feet of air per minute with an outlet or nozzle velocity of at least 90 miles

* From paper presented at American Phytopathological Society, Cincinnati, December, 1951.

Numerous problems attend development of concentrated fungicide sprays, but the economies involved promise to make efforts well worth while. A prominent plant pathologist explains low gallonage fungicide sprays on vegetables.

per hour. The number, capacity, and arrangement of the liquid nozzles used in the air blast are capable of considerable variation, as is the pressure at which the fungicide-bearing liquid is delivered to the air blast. However, regardless of the general specifications, every effort must be made to obtain the best possible distribution of the fungicidal ingredient over the foliage mass to be treated.

As the amount of water to be used in the spraying operation is progressively reduced, the difficulty of obtaining a satisfactory thoroughness of foliage coverage is correspondingly increased. Field experience so far obtained with various types of applicators indicates that the possibility of obtaining a satisfactory degree of disease control may decrease if one tries to use greater than a 4X or 5X concentration applied at less than 40 or 30 gallons per acre.

Applicators in considerable number and variety have been tested in Ohio for the use of concentrated formulations in low-gallonage applications during the past 10 or more years. During the past 3 years X, 2X, and 4X concentrations have been compared on tomatoes at Wooster. The 2X applications were made by substituting different nozzles in the standard boom, but the 4X formulations were applied by equipping a special boom with low-delivery nozzles and then taking the spray mixture from the high-pressure pump to the boom through a by-pass equipped with a secondary relief valve and a line strainer. The pressures used for the X, 2X, and 4X formulations were approximately 300, 200, and 100 p.s.i., respectively.

In most instances, the 4X concentrations of several different fungicides applied at 40 gallons per acre have given as good control of early and late blights of tomato as have the usual treatments. The control of anthracnose fruit rot of tomato has not been quite as good with the 4X applications as when 160 gallons per acre were used. The use of air to force the 4X spray mixtures into the foliage mass added little or nothing to disease control, largely because distribution was not as even and thorough over the leaves.

Further Tests Made

LARGE air blast machines have also been used in three or four experiments. Results have been comparatively good, especially where the volume applied has not been dropped below 40 gallons per acre. Some applications of an 8X concentration at 20 gallons have given fair results under conditions where disease has not been too severe.

A considerable variety of fungicides have been used with little positive evidence of an increase in phytotoxicity with an increase in concentration. In a few borderline cases, such as the use of some of the fixed coppers on cucurbits or beans, the injury sometimes caused by these materials at regular dilutions and volumes of application was increased when a 4X concentration was applied at 40 gallons per acre.

Several different fungicide-insecticide combinations in 4X formulations have been applied to various vegetables without injury to most of the species used, and with a satisfactory degree of disease and insect control. Experiments in which different types of nozzle patterns have been used in applying 4X formulations of various fungicides indicate that the flat-spray pattern may prove to be the most efficient type for direct application without air. The hollow-cone pattern was nearly as effective as the flat pattern, and the solid-cone type of distribution gave the poorest results.

In summarizing the results obtained and the observations made up to the present, it is evident that few positive statements or recommendations can as yet be made. However, it may be said that the evidence now available indicates strongly that considerably less water may be used in formulating and applying fungicides to row crops, including many of the vegetables, without sacrificing very much in the way of disease control. At present the research emphasis should be placed on the development of applicators which will insure a maximum degree of thoroughness in the distribution of the spray material over the foliage area being treated. There are numerous fungicides which may be used safely and effectively in at least 5X concentrations. The introduction of a fungicide which can be applied in the form of a solution would do much to hasten the day when low-gallonage spraying might become the rule rather than the exception.★★

Health Hazards Associated with

Handling and Use of

THE purpose of this paper is to outline the health hazards associated with the handling and use of some of the herbicides employed widely today.

Before discussing specific materials, the terms "toxicity" and "toxic hazard" should be defined. These terms are not synonomous although they are sometimes thought to be; *toxicity* is a property of matter; it may be defined as the property of causing injury to the living organism by other than mechanical means. *Toxic hazard* may be defined as the likelihood that a substance will cause toxic injury.

Warning properties such as foul odors or tastes, lachrymation, or irritation, which become apparent and highly disagreeable from harmless exposure, tend to prevent the likelihood of serious exposure and thereby reduce the hazard. Similarly, the absence of such properties tends to increase the hazards. Physical properties such as vapor pressure, solubility, dustiness, etc., may either increase or decrease the hazard of a material depending upon how it is handled and used. It follows that a material may be highly toxic and yet may not be particularly hazardous; and conversely, a material may be relatively low in toxicity and yet be quite hazardous.

During the last 10 years, and to some extent during the preceding 10 years, more and more attention has been paid to the effects of herbicides upon human subjects, livestock, and wildlife. The development of new and better herbicides and new uses for old ones has led to a tremendous increase in their use by an increasing number of people and to their use over prolonged periods of time by custom operators. The likelihood of human exposure to these materials, has been increased many fold by these new developments. If these newer materials are to be handled safely, specific directions for their use and specific precautions against misuse must be issued. In other words, specific hazards must be defined and information given on how to avoid hazardous exposure. In order to do this intelligently, facts must be known about the chemical, physical, and toxicological properties of the material, about the form and manner in which it is to be handled and applied, and about the likelihood and magnitude of exposure. Industry has recognized and accepted this responsibility.

To be specific, what health hazards are presented by the various commonly used herbicides? and, how should they be handled in order to insure safety?

Sodium Chlorate

THE principal hazard associated with the use of sodium chlorate as an herbicide is that of fire. Vegetation sprayed or dusted with chlorate constitutes a real fire hazard. Clothing contaminated with dry chlorate is easily ignited. Sodium chlorate is not particularly toxic if ingested and in normal use, the likelihood of ingesting dangerous quantities is remote The material is not particularly irritating to the skin and is not absorbed through the skin in significant amounts; hence, the hazards from topical contact are not serious. Information with regard to its effect upon the eyes is lacking.

Precautions for safe handling should be directed primarily toward the elimination of the possibility of fire and, secondarily, toward the avoidance of unnecessary personal contact.

Although cases of livestock poisoning due to chlorate have been reported, most experience has indicated that when used as recommended, it does not present a hazard to livestock grazing in treated areas (1). Precautions should be taken to spread the solid evenly so as not to leave piles of it available and to avoid leaving containers of the material where stock can get it. Salt-hungry stock are most likely to consume toxic amounts of this material (2).

Borax

AVAILABLE information indicates that the use of borax as an herbicide or soil sterilant does not present significant health hazards. The material is fairly toxic if ingested, but the likelihood of ingestion is small. No special handling precautions are believed necessary.

Experience has indicated that the ordinary use of the material does

Herbicides

by

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not present a hazard to livestock or wildlife.

The combination of sodium chlorate and borax (1 part chlorate and 9 parts borax) essentially eliminates the fire hazard from sodium chlorate. The health hazards of the combination are not believed to be of significance.

Special precautions in handling are not believed to be necessary, since experience has indicated that the material does not present a significant hazard to stock and wildlife.

Arsenicals

THESE materials, (Sodium Arsenite and Arsenic Trioxide) present serious hazards of handling and use probably greater than those of any other herbicide. They are highly toxic and the consequence of accidental ingestion of even relatively small amounts is very likely to be death. When handling or applying these materials, particular care must be taken to prevent ingestion, inhalation of dust or spray, and skin contact. Particular care must be exercised in the disposal of sludge or residues from spraying and of contaminated containers.

The hazard to livestock and wildlife from eating sprayed vegetation or from drinking water contaminated by these materials is serious.

Calcium Cyanamid

HEALTH hazards associated with the use of calcium cyanamid are those resulting from contact with the skin and eyes and from inhalation of dust. The hazard from possible ingestion is of little significance.

Precautions for safe handling should include measures to prevent contact with the skin. When handling dusty material, coveralls which fit tightly at the neck, cuffs, and ankles will be helpful in preventing skin contact, as will wearing a hat. Exposed surfaces of the skin may be protected by covering with a bland oil or appropriate protective cream. The skin should be washed thoroughly at the end of each day. Contaminated clothing should be washed before re-use.

Care must be exercised to prevent cyanamid from getting into the eyes. If this should occur, the eyes should be flushed immediately with an abundance of clean water and medical attention obtained.

The breathing of cyanamid dust should be avoided. A respirator should be worn whenever the breathing of dust cannot be avoided by other means. This is particularly important when exposures are repeated or prolonged.

When the granular form of cyanamid is used, the hazard is reduced significantly.

Herbicidal Oils

NUMEROUS oils have been used as herbicides, alone and in combinations with other materials. However, a discussion of the individual oils is beyond the scope of this paper.

Toxicological information regarding the oils is very meagre. Judging from past experience and what is known of the toxicity of petroleum fractions, certain generalizations are justified. It is likely that the most significant hazard presented by the oils would be that of dermatitis caused by prolonged or repeated skin contact. Contact with the eyes may be quite painful, but serious eye injury is probably not likely. The hazard from ingestion is not usually serious unless such materials are swallowed in substantial quantity. The hazard from inhaling vapors or mists of the oils when used as herbicides is not believed to be serious, mainly because the likelihood of inhaling appreciable amounts in normal use is very small. The hazard from fire should not be overlooked.

Precautions for safe handling should be directed toward the avoidance of prolonged and repeated skin contact. Clothing, particularly shoes, wet with oils should be removed and cleaned before re-use. Heavy mists of oil alone or in combination with other toxicants should not be breathed repeatedly or for prolonged periods; under certain conditions, respiratory protection may be necessary to insure safety.

Ammonium Sulfamate

USE of ammonium sulfamate as an herbicide does not present significant health hazards. This conclusion is based on toxicological studies conducted by Ambrose (3) and is borne out by extensive use over an appreciable period of time without reported injury to either humans or livestock.

No special handling precau-

*Paper presented at Northeastern Weed Control Conference, New York City, January 4, 1952.

tions are necessary. The material presents no fire hazard.

Pentachlorophenol

HAZARDS attending the use of pentachlorophenol are those of absorption of toxic amounts of the material through the skin, skin irritation, eye irritation, and ingestion (4, 5, 6). There is no fire hazard. The dusts of the free phenol and of the sodium salt and oil or water sprays of either are quite irritating to the nose and eyes, sufficiently so that toxic amounts are not likely to be inhaled. Pentachlorophenol may be absorbed through the skin in toxic amounts from concentrated preparations if contact is extensive and prolonged. The irritating action on the skin will vary considerably with the solvent. In general, strong solutions (10% or more) may cause skin irritation on single prolonged exposure, but contacts of short duration are not likely to irritate. Fine dust or solutions as dilute as 1% may irritate upon prolonged and repeated exposure; if exposures are continued over a considerable period of time, an "acne-like" dermatitis may develop. Special tests conducted on human subjects have suggested that the sodium salt, but not the free phenol, possesses a slight tendency to cause hypersensitivity. These results are interpreted to mean that a very few persons may show increased susceptibility after once having a rather severe rash; in practice, this has not been of importance.

Although pentachlorophenol is rather toxic when swallowed, its use as an herbicide does not ordinarily offer opportunity for sufficient intake to be dangerous.

Its safety in regard to livestock feeding upon freshly sprayed forage has been indicated by Grigsby and Farwell (7).

The hazards associated with the handling and use of pentachlorophenol can be avoided by taking precautions to prevent contact with the skin and eyes. If such contact does occur, the material should be removed promptly by washing. Contaminated clothing or shoes should not be worn. In instances where contact cannot be avoided, the necessary protective clothing should be worn—such as goggles, rubber boots, and rubber gloves.

Dinitrophenols

THE hazards attending the handling and use of the dinitrophenols (Dinitrocresols and Dinitro-o-secondary butylphenol) as herbicides are predominantly related to their acute toxicity (8), to the ability of the skin to absorb them, and to their rapid absorption following inhalation of dust preparations. The dinitrophenols generally do not present a hazard of skin irritation or eye injury; however eye irritation may result from contact with certain preparations. Rarely a person exhibits hypersensitivity to these compounds; if so, that person has no alternative but to avoid them carefully. Some liquid preparations are flammable because of the solvents employed; the dinitrophenols, except for dry sodium cresolate, do not present a fire hazard.

In handling dinitrophenol concentrates, either solutions or dusts, precautions should be taken to avoid skin contact and inhalation. Protective clothing such as coveralls, hat, rubber boots, rubber gloves, and a dust respirator may be required—depending upon conditions. If contact with concentrates should occur, contaminated clothing should be removed promptly and the exposed skin thoroughly cleansed with soap and water.

In applying sprays, prolonged breathing of mist should be avoided. When clothing becomes obviously wet with dilute sprays, it should be removed within a short time and the skin cleansed. It is always advisable to bathe each day after applying spray. It should be remembered that the staining of the skin and clothing by dinitrophenol compounds gives no indication of the quantity absorbed or of the actual hazard involved, but merely shows that there has been some contact with the material.

The improper disposal of sludge or residues left after spraying can present a hazard. These should be disposed of so that they will not be available to animals and so they will not contaminate water supplies or streams.

Residues upon foliage treated as recommended are not hazardous to grazing livestock (1).

2,4-D and Others

THREE other materials, 2,4-Dichlorophenoxyacetic acid, its salts and esters (2,4-D); 2,4,5-Trichlorophenoxyacetic acid, its salts and esters (2,4,5-T); and, 4-Chloro-o-toloxyacetic acid, its salts and esters (MCP), can be considered together because their toxicological properties are very similar and because they are used in essentially the same manner (6,9,10, and 11).

These materials present hazards of eye injury and skin irritation. Dusts and strong solutions are capable of causing appreciable injury to the eyes. Dusts in high concentrations may cause irritation of the upper respiratory tract. Repeated or prolonged contact to concentrated formulations may result in skin irritation, while contact with dilute solutions, such as are used for spraying, could possibly cause irritation of the skin. However, this is highly unlikely except, perhaps, in the unusually susceptible person. As ordinarily handled, these materials are not likely to cause skin irritation, eye irritation, or skin sensitization (6). They are not absorbed through the skin to any appreciable extent, and in the amounts likely to be inhaled, are not hazardous. The ingestion of harmful amounts is not likely.

In themselves, 2,4-D and 2,4,5-T do not constitute a hazard to livestock grazing on treated areas (7). On the basis of laboratory studies, the same is believed to be true of MCP. However, it has been suggested that spraying with 2,4-D and 2,4,5-T may render certain plants toxic or possibly make some toxic plants more palatable or attractive. This subject is presently undergoing considerable study; its practical significance has not been great, but cannot be evaluated fully until more data are available.

Precautions for safe handling should include measures necessary to prevent dust or concentrated preparations from getting into the eyes and to avoid prolonged and repeated skin contact with concentrates. If contamination of the eyes should occur, they should be flushed promptly with clean flowing water for at least 15 minutes and then medical attention should be obtained.

Sodium Trichloroacetate

SODIUM TCA in concentrated form, presents hazards of skin irritation, eye irritation, and respiratory irritation. The material presents no hazards from ingestion or from absorption through the skin (6). Contact with the dust or spray solution, particularly on the face, results in a pronounced burning sensation but serious injury is not likely unless exposures are severe and prolonged. Inhalation of dust may be painful to the nose and upper respiratory passages, but is not likely to cause serious effects.

Precautions in handling and use should be directed toward avoiding contact with the skin and eyes. Protective clothing such as coveralls with tight fitting neck and cuffs and a hat are effective protection. Contaminated clothing should be removed and washed before re-use. If skin contact occurs, promptly remove the material by washing with water. If the eyes should become contaminated, they should be flushed with clean water for at least 15 minutes and medical attention obtained.

No significant hazard to livestock exists from their eating or contacting sprayed foliage. (7).

IPC Materials

NO appreciable hazards appear to be involved in the use of Isopropyl N.-Phenyl Carbamate (I. P. C.) and Isopropyl N-(3-Chlorophenyl)-carbamate (chloro I. P. C.) as herbicides. They are low in toxic-

(*Turn to Page* 110)

With the Camera at Recent Northeast Weed Meeting

Top row (left): New President of Northeastern Weed Control Conference, C. E. Minarik, receives congratulations from out-going head of the group, Dr. S. M. Raleigh, Pennsylvania State College, State College, Pa. Dr. Minarik is located at camp Detrick, Frederick, Md. In the second picture is Roy L. Lovvorn, in charge of Weed Investigations, U. S. Department of Agriculture, Beltsville, Md.; Dr. Douglas Tate, U. S. Rubber Co., Naugatuck Division; and Dr. Stacy Randle, Rutgers University, New Brunswick, N. J. Drs. Tate and Randle were high school classmates in Blue Mountain, Mississippi, and had not seen each other for 25 years. They were reminiscing at the weed meeting.

Bottom row: Out-going president Raleigh discusses program with conference secretary-treasurer, W. C. Jacob, Long Island Vegetable Research Farm, Riverhead, L. I. Second photo: 1952 officers of NEWCC: H. I. Yowell, former president, newly-elected to be editorial representative of the Conference's quarterly publication, "Weeds"; Dr. Jacob; Dr. Minarik; and R. F. Beatty, American Chemical Paint Co., Ambler, Pa., vice-president

EDCO
AGRICULTURAL INSECTICIDES

PARATHION

25% EMULSION

25% DUST BASE

15% WETTABLE POWDER

TEPP-40

TETRAETHYL PYROPHOSPHATE

ALDRIN

EMULSIFIABLE CONCENTRATE

DUST BASE

BHC

12 GAMMA

36 GAMMA

DIELDRIN

EMULSIFIABLE CONCENTRATE

DUST BASE

DDT

EMULSION
EMULSIFIABLE CONCENTRATE
WETTABLE POWDER
DUST BASE

EDCO CORP.

ELKTON MD

Testing Soils for Insecticide Residues

Robert D. Chisholm and Louis Koblitsky

U. S. Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, Moorestown, N. J.

INSECTICIDES are deposited on the soil as a result of the spraying or dusting of crops, or they may be applied to the soil for insect control or to meet quarantine requirements. Some insecticide residues may retard the growth of certain plants, as reported to Foster (*2*), or make the crop unpalatable, as reported by Pepper *et al.* (*6*). A determination of the concentration of the insecticide residue may indicate the degree of hazard to the plant or crop and is essential to compliance with quarantine requirements. Such a determination involves sampling the soil, removing the insecticide residue from the sample, and analyzing the recovered material. Each step is of equal importance.

The concentration of insecticide in the soil may be expressed on a weight-volume basis (pounds per acre of specified depth) or on a weight-weight basis (parts per million). Since soils differ in bulk density, insecticide concentrations can be compared only on a weight-volume basis. If they are expressed on a weight-weight basis there may be little relation between the concentration reported and the actual weight of insecticide in a given area and depth of various soils. The weight of an acre of many field soils, including stones and other debris, to a depth of 3 inches is close to 1 million pounds. The weights of similar volumes of other soils may range from about 800,000 to 1,200,000 pounds. When 25 pounds of an insecticide has been worked into various soils to a depth of 3 inches, the concentration of the insecticide on a weight-volume basis is in all cases 25 pounds per 3-inch acre, but on a weight-weight basis it may range from 20 to 30 parts per million.

Sampling

IN the sampling of soils, consideration is given to the depth to which an insecticide has been deposited and to the uniformity of its vertical and lateral distribution. The depth to which an insecticide is distributed should be determined from the analysis of cores taken from successive layers of soil. Otherwise, serious errors may be introduced. For example, when an insecticide has been mixed uniformly with the soil to a depth of 6 inches and the sample depth is only 3 inches, analytical results can represent only one-half of the insecticide in the soil when expressed as pounds per 3-inch acre but are correct when expressed as parts per million. If the mixing has not been uniform, no estimate of the error involved can be made with reference to either method of expression. When the limit of vertical distribution has been established, composite samples each consisting of a number of cores from each layer should be taken to determine the average concentration of the insecticide throughout the area. When successive layers of soil are being sampled, it is essential that none of the top layer fall into the hole when each core is removed.

Close approximation of the amount of an insecticide in an area may be obtained if only the layer containing the major portion of the insecticide is sampled. If the insecticide has been applied to ground under cultivation, it can be expected to be located at least to the depth of tillage. If it has been applied to uncultivated ground or to turf, it can be expected to be close to the surface. For example, in plots cultivated to a depth of about 3 inches composite samples taken about a year after the application of 25 and 50 pounds of DDT per acre showed that on an average, 88 percent of this insecticide was located in the top 3-inch layer and the remainder in the 3- to 6-inch layer. Analyses of individual cores 1 inch deep taken from successive layers at 25 locations in a turf plot about a year after the application of 25 pounds of DDT per acre, revealed that 92 percent of the insecticide was located in the upper 1-inch layer and the remainder in the next two layers. In both cases, approximations could have been made with an error of about 10 percent if only the layer containing the ma-

Presented on April 4, 1951 at the Boston, Massachusetts meeting of the American Chemical Society.

jor portion of the insecticide had been analyzed.

The influence of the shape of the sample on the analytical results will depend upon the uniformity of vertical distribution and the terms used in expressing the results. When the tool used for sampling has vertical sides, the volume of the sample can be calculated from its cross-sectional area and depth as a fractional part of a volume of soil 1 acre in area and having a depth equal to that of the sample. In such a case, regardless of uniformity of distribution, the analytical results may be expressed correctly in terms of either pounds per acre or parts per million. However, if the shape of the sample approaches that of a cone, as is often the case when a trowel is used for sampling, the sample is representative only when the insecticide is uniformly distributed, and only then can the results be expresed in either terms. If the insecticide is not uniformly distributed, neither method of expression is correct. When most of the insecticide is close to the surface, the results will be low in terms of pounds per acre and high in terms of parts per million. If most of the insecticide is at a lower depth, the results will be low by either method of expression.

The number of cores required to form a composite sample that will be representative of the entire field plot is dependent upon the uniformity of the lateral distribution of the insecticide. Since this distribution may be highly variable, the number of samples required for the desired precision of estimate should be determined by trial and error. In a study of distribution in turf, in which 25 cores 2 inches in diameter and 3 inches in depth were taken about a year after the application of 25 pounds of DDT per acre, it was found that the concentration of DDT ranged from less than 1 to 74 pounds with an average of 24 pounds per acre. In another study, in which 50 similar cores were taken from a nursery section in which lead arsenate had been applied at the rate of 1,000 pounds per acre and cultivated into the soil to a depth of about 3 inches, it was found that the concentration of the lead arsenate ranged from 289 to 3,437 pounds and averaged 977 pounds per acre. A method of sampling that involves taking a composite of 50 cores 2 inches in diameter and 3 inches in depth from locations rather evenly spaced throughout areas of 20,000 square feet or less, described by Koblitsky and Chisholm (5), has been used for many years for sampling plots regulated by the Japanese beetle quarantine. The depth and number of cores required for composites representative of specific distributions should be determined by test.

The composite sample as taken from the plot is weighed when the analytical results are to be reported on the weight-weight basis, but weighing is not necessary when the results are to be reported on the weight-volume basis. To facilitate the taking of a subsample, it is desirable to screen the composite sample to separate the stones, grass, and miscellaneous debris from the soil. Since the stones do not contain any of the insecticide they may be discarded, but the grass and debris are saved for a separate analysis. The portion of the composite that has passed through the screen is thoroughly mixed and weighed. Subsamples of convenient size are taken in small portions from the screened soil, weighed, exposed in shallow trays until nearly air-dry and then reweighed. If subsamples have not been dried sufficiently or if they have been dried thoroughly, low recoveries due to incomplete contact of the solvent with the insecticide may be obtained on extraction. Subsamples that have not been dried sufficiently have a tendency to form balls during the extraction. Some of the insecticide may be lost by volatilization from subsamples that have been dried thoroughly, or it may be encased in the pellets often formed on drying certain soils such as those high in colloids. The nearly air-dry subsample is weighed and an aliquant taken for analysis.

Removal from Soil

THE removal of the insecticide from the soil, may be accomplished by extraction with a solvent or by decomposition of the insecticide in the soil and recovery of one of the products by distillation. Many solvents—including acetone, benzene, ethyl alcohol, isopropyl alcohol, petroleum ether, and mixtures of these compounds—have been tested as extractants for insecticides such as DDT and chlordane. In some cases, the amounts of soil constituents removed were excessive, and in others, the removal of the insecticide was incomplete. The most consistent recoveries have been obtained with a mixture of benzene and isopropyl alcohol (2:1 by volume). The slight amount of water that may be extracted from the soil by this mixture is easily removed by treatment of the extract with anhydrous sodium sulfate. Almost complete extraction may be obtained by rotating mechanically a mixture of the soil and solvent for ½ hour; an aliquant of the extract is then recovered by filtration.

Methods of Analysis

METHODS that are satisfactory for the analysis and identification of specific insecticides in pure form have not been applied successfully to their determination in the presence of all types of soils. Many soils contain extractable materials that interfere with such determinations. A method may be usable for certain soils but not for others. For example, W. E. Westlake[1] adapted the Claborn (1) method to the determination of DDT in certain orchard soils in Washington. This adaptation did not give reliable results with nursery soils in New Jersey.

In the absence of methods for specific soils, the DDT and chlordane equivalents have been calculated from determinations of organic chlorine as described by Koblitsky and Chisholm (5). When sandy, clay, and muck soils containing 25 pounds of DDT per 3-inch acre were analyzed by this method, the calculated con-

(*Turn to page 119*)

[1]Private communication from W. E. Westlake dated February 28, 1950.

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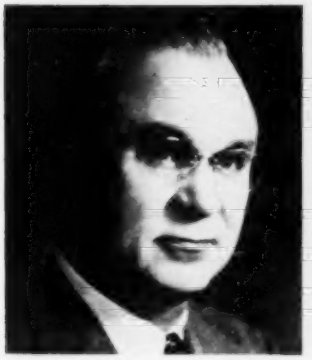

Research and Educational Activities of the PLANT FOOD INDUSTRY

by

H. B. Seims

Director of Research,
Plant Food Division, Swift & Co.
Chicago, Ill.

FROM time to time the statement is made by individuals not well acquainted with the plant food industry, that it has not kept pace research-wise compared to other manufacturing industries. It may be true that the results of research in fertilizer manufacture probably do not make the headlines; but there are reasons for this fact, which will be discussed later.

Research activities of the plant food industry fall into two entirely separate categories. The first might be described as agronomic research and education.

Agronomic Research

WITH the agronomic research in laboratory and field studies carried on by the U. S. D. A. and state experiment stations, there is no reason for plant food manufacturers to parallel such research. Indeed, they can neither afford to nor would the results of such studies, if undertaken, be received in total confidence by consumers of fertilizers and fertilizer materials. By leaving research in the use and application of plant nutrient materials to the state and federal agencies, no charge or bias can ever be leveled at the results of the investigations. The plant food industry and its suppliers, however, do participate actively in support of such research with technical and financial assistance, as well as educational and informational activities publicizing the results and findings of research in plant nutrition.

Agronomic research and educational activities in which the plant food industry and its suppliers are engaged, include the following.

The National Joint Committee on Fertilizer Application. Through the leadership of the late "Abe" Smalley of the National Fertilizer Association, a need for new studies and correlation of existing data relative to obtaining best use of fertilizers through proper placement was recognized by agricultural authorities. A committee was formed for this purpose in 1925 and has operated continuously since then.

Member organizations include the American Society of Agronomy, American Society of Horticultural Science, Farm Equipment Institute, American Society of Agricultural Engineers, National Canners Association and the National Fertilizer Association. Each year the joint committee meets with the annual session of one of the member groups. The needs as envisioned by its founders have certainly been fulfilled.

Recommendations of the committee have resulted in improvements in plant food placement machinery, and in publicizing and educating consumers in how to make the most efficient use of their fertilizers. Proceedings of the annual meetings are published and distributed free by the N F A.

Plant Food Research Committee of the N F A. Composed of industry agronomists and technical men, this committee arranged for the publication of the well known "Hunger Signs in Crops" and more recently the monograph entitled "The Peanut — The Unpredictable Legume." The committee has cooperated with the National Joint Committee on Fertilizer Application. Years ago, under the leadership of Dr. F. E. Bear, then committee chairman, it pioneered the concept of *heavy* fertilization—a practice which has paid off handsomely—a prime example of this being the increased corn yields of the southern states.

Graduate Fellowships and Research Grants-In-Aid to Colleges. Several plant food manufacturers, raw materials producers and educational agencies, including the American Potash Institute, National Fertilizer Association, American Plant Food Council, Coke Oven Ammonia Research Bureau, Swift & Company, International Minerals and Chemical Corporation, American Cyanamid Company, Barrett Division of Allied Chemical & Dye Corporation, Spencer Chemical Company, and the Tennessee Corporation, provide funds

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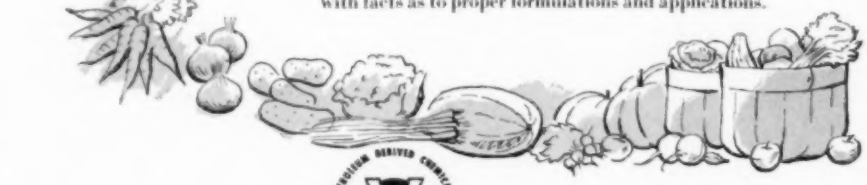

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for projects related to the use of fertilizers and plant nutrition. For example, Swift & Company, in addition to its fundamental research grants in studies of *human* and *animal* nutrition, and market studies, is actively supporting basic research in *plant* nutrition at the University of Wisconsin, University of Missouri, University of Texas, Texas A & M College, Rutgers University, University of Illinois, Ohio State University, and University of Florida. The funds are provided with no strings attached; that is, they can be used for any type of fundamental research study dealing with the general field of plant nutrition. We feel that without *fundamental* research, *applied* research would later suffer from lack of knowledge in basic problems. Publication and dissemination of results is left entirely to the respective institutions.

Through the support of the American Potash Institute and the International Minerals & Chemical Corporation, farmers and growers in many sections of the United States and Canada have benefitted from the knowledge gained from studies on potassium and magnesium needs of plants and soils. Nitrogen producers have supported research in the nitrogen requirements of corn and wheat in the South, Middle West and Northeast, and the tremendously increased grain yields of the past few years are the simple difference between plenty of nitrogen and not enough.

Education and Service Organizations. Education and service organizations, aside from the trade associations, whose activities are well recognized, are the Chilean Nitrate Educational Bureau, Coke Oven Ammonia Research Bureau and the American Potash Institute. Naturally their primary function is to promote the use of products of their sponsors but their field is not that of sales as such. Rather, these organizations have made real contributions to American agriculture through the encouragement of good farming practices, establishment of educational demonstrations, and contributions to popular and technical literature on subjects in their field. They amplify and disseminate experimental and extension information on a scale not possible for individual colleges and experiment stations.

The Industry Committee on Tagged Element Research. This committee is composed of several plant food manufacturers and was formed four years ago in order to help finance research and plant nutrition through the use of radioactive isotopes utilized as tracer elements. The committee's funds supplemented those provided by the Atomic Energy Commission and the U. S. Department of Agriculture, and help to make possible extensive basic studies, particularly on phosphorus and its behavior in soils and plants.

Agronomists Employed by Industry. Several plant food manufacturers and raw material suppliers, including V-C, Swift, Federal Chemical Company, International Minerals & Chemical Corporation, F. S. Royster Guano Company, Tennessee Corporation, and nitrogen producers have on their technical staffs one or more agronomists. These men keep their organizations informed as to the latest developments in plant nutrition and fertilizer use in order that the needs of agriculture can best be supplied. Among their other duties are educational and sales service work, providing technical information on the best use of fertilizers, not only to their own sales organizations but to the consuming public.

The above information has pointed out that in the field of agronomic and plant nutrition research the industry has elected to support the programs of already established institutions and organizations rather than to compete with them. The decision to supplement such institutional programs, confining our activities to filling the gaps, has proved to be a wise one. It is thought that those in the field of government research and control prefer this method, and industry hopes that it can continue to serve as a catalyst in expediting research programs in this field.

Technological Research

THE second group of research activities of the plant food industry might be labeled technological and manufacturing research. It is in this field that little publicity is forthcoming. One reason is that industry consists principally of small manufacturing concerns who do not have the income necessary to support research laboratories. Another reason is that those manufacturers who do engage in extensive research have very good reasons for not publicizing their findings; the industry is highly competitive, and the investment of private funds is involved.

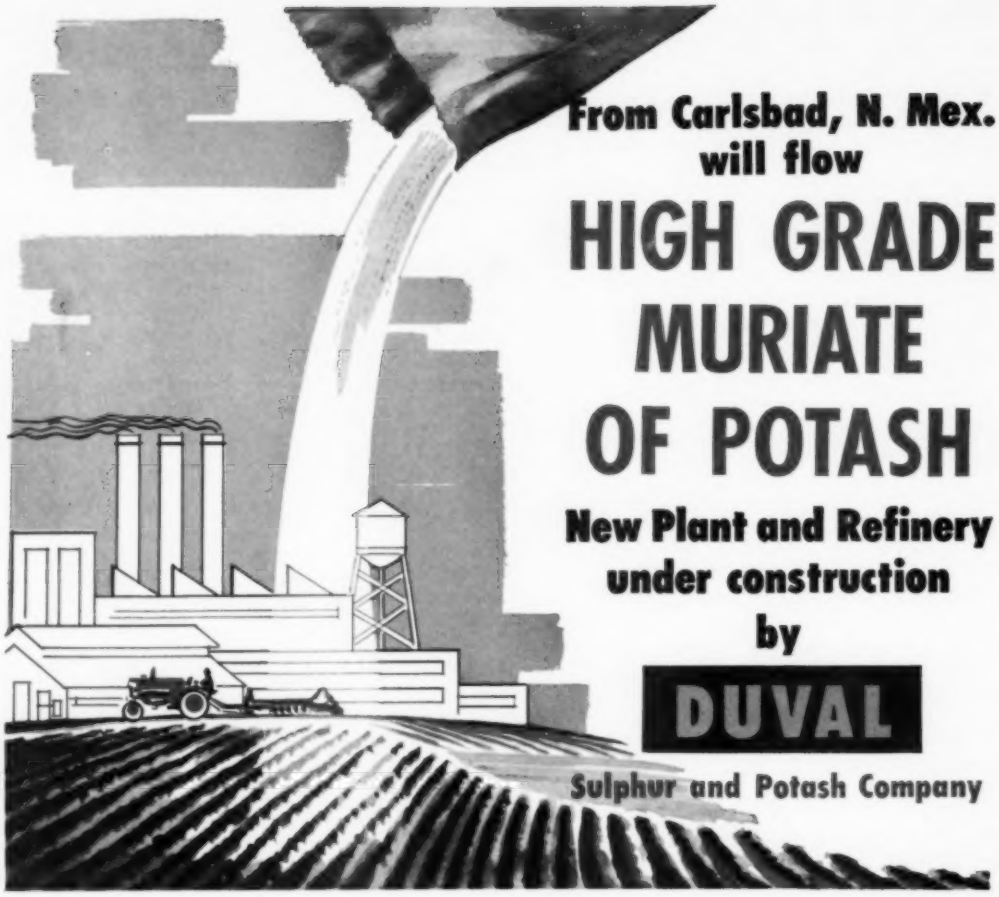
However, at the present time the Tennessee Corporation, IM&CC and Swift, to my personal knowledge, maintain laboratories devoted entirely to development of new processes, as well as applied research in fertilizer manufacturing and technology. Other manufacturers maintain research fellowships at such privately endowed laboratories as the Battelle Memorial Institute and the Mellon Institute.

A new phase of privately financed plant food manufacturing research was established last year by six manufacturers. The "Stagson Research Corporation" with a laboratory at Charleston, S. C., and engaged in research and development, is supported by the Smith-Douglass Company, Naco Fertilizer Company, Acme Fertilizer Company, Southern Fertilizer and Chemical Company, Gulf Fertilizer Company, and I. P. Thomas & Son Co.

The meetings of the Division of Fertilizer Chemistry of the A.C.S. have probably provided more papers on fertilizer research than any other source.

Many improvements in fertilizer manufacturing processes and finished product have resulted from research conducted by the industry, sometimes in cooperation with processing equipment manufacturers.

Continuous and semi-continuous production of superphosphate in mechanically excavated dens came



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about through the joint efforts of the plant food industry and such equipment suppliers as Sturtevant, Atlanta Utility Works, and Sackett. As a result of research, better superphosphate is made now than in years past with the use of higher strength acid in acidulation.

An ever-present problem . . . that of maintaining good physical condition in high analysis grades . . . is receiving constant attention and progress is being made, although individual manufacturers do not, of course, publicize anything they may develop to their advantage.

Improvements in granulated fertilizers and methods of manufacturing the less costly "granular" (as compared to granulated) goods are being sought through manufacturing research.

More efficient and safer materials handling equipment is constantly being produced in cooperation with manufacturers of the equipment. As an example, through the use of tractor loaders and batching hoppers in factories, the one-time efficient crane type plant now suffers in cost comparison. Improvements in materials handling and greater safety for workers is now possible through dynamiting storage piles with multiple shots and delayed action caps, instead of simple shots. By this means over 500 tons of material can be disintegrated at one time and the pile is left without dangerous overhangs.

A recent agreement between the National Fertilizer Association and the Tennessee Valley Authority will be of great technical advantage to small producers who are unable to maintain their own research laboratories. NFA's Plant Food Research Committee will cooperate with TVA to keep industry informed of new developments in research which might benefit the industry and the farmer.

In connection with ammoniation of superphosphate and the use of nitrogen solutions generally, contributions of E. I. duPont Company and the Barrett Division of Allied Chemical & Dye Corporation should receive recognition. These two nitrogen producers, as well as the Spencer Chemical Company, also provide technical assistance to their customers in the selection and use of various ammoniating liquors. Their trouble shooting has been of special benefit to smaller manufacturers.

Phosphate mining and phosphoric acid manufacture are by no means neglected fields of research, as evidenced by the fact that probably no two manufacturers or miners use exactly the same processes. Several Florida and Montana rock producers and phosphoric acid manufacturers maintain research activities in connection with their mining and acid manufacturing operations. Again, for reasons mentioned above, the results of their research are "bread and butter" to their companies and therefore are not publicized.

The research activities described here are those with which the writers are personally acquainted. Undoubtedly, there are others not mentioned. Considering the necessary limitations on publicity, the technological and manufacturing research in the plant food industry seems impressive now, and with the recent NFA-TVA agreement will become more so in the future. In the support of research and education, the plant food industry is second to none and with this pre-eminence justifies not only the faith of its stockholders, but also the confidence of the consuming public.★★

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N. E. Fertilizer Meet

The New England Fertilizer Conference is scheduled to be held at Amherst, Mass., Feb. 18 and 19, with a full program of discussions and the presentation of technical papers.

According to advance announcements, F. J. Sievers, director emeritus of the Massachusetts Agricultural Experiment Station, will preside over the sessions, and Dale Sieling, director of the Station, will make the welcoming comments.

The banquet, scheduled for the evening of Feb. 18, will be presided over by E. S. Russell. Ford S. Prince, U. S. D. A. Agricultural Research Administration, is to present slides on foreign agricuture following the dinner.

Included on the program are Dr. Russell Coleman, president, National Fertilizer Association, Washington, D. C.; W. G. Colby, J. E. Steckel and Mack Drake, Massachusetts Agricultural Experiment Station, L. H. Smith, Vermont Agricultural Experiment Station; Dr. Murry C. McJunkin, Coke Oven Ammonia Research Bureau, State College, Pa.; Joseph A. Chucka, Eastern States Farmers' Exchange; S. D. Gray, American Potash Institute; and W. A. Albrecht, Missouri Agricultural Experiment Station, Columbia.

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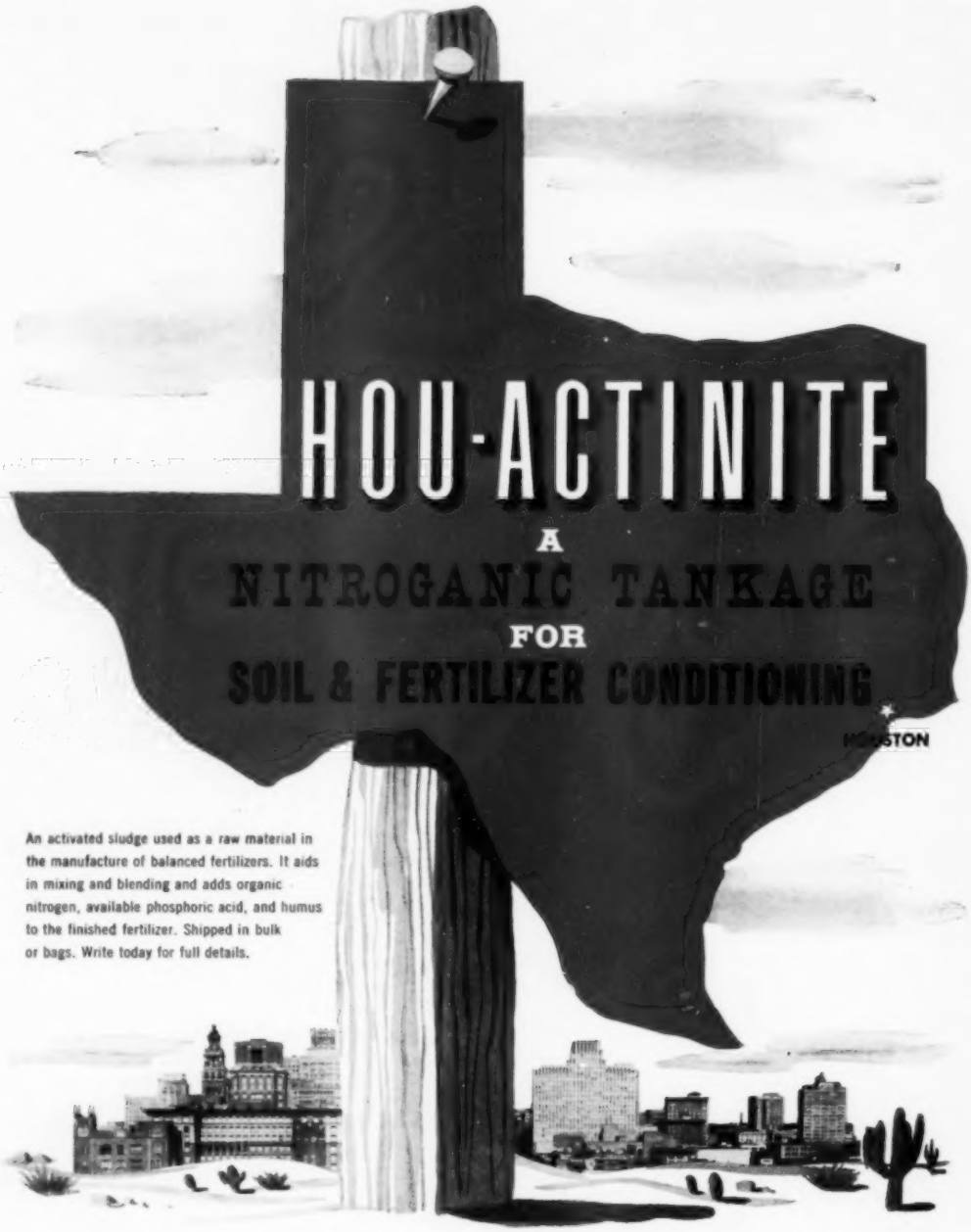
Clemson School Being Held

A three-day pesticide chemicals school was in progress at Clemson, S. C. as this issue went to press. The meeting, scheduled to be held January 28-30, was to get under way Monday morning (Jan. 28) with an address of welcome from Dr. R. F. Poole, president of Clemson. Discussions and reports of research on many phases of the use of chemicals in the control of pests of agriculture were to be presented by workers of the South Carolina Agricultural Experiment Station, the Clemson Extension Service, the Clemson College of Agriculture and visiting representatives of groups or agencies concerned with this problem.

The general program of the first day was to include talks on the outlook for chemicals, their principles and application in the control of weeds, grasses, shrubs, trees, insects, rodents, plant diseases and parasites of livestock.

Custom sprayers and dusters were to discuss their problems on January 29, with both airplane operators and pest control operators taking part. Wednesday's session was to cover household pest control.

Arrangements for the school were made under the direction of Dr. M. D. Farrar, head of the Clemson department of Entomology and Zoology; Dr. H. P. Cooper, director, South Carolina Agricultural Experiment Station, and D. W. Watkins, director, Clemson Extension Service.



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Manufacturing Chemists' Association sponsors all-day inter-industry conference presenting views of individuals and groups on hazards of

Chemicals in Foods

THAT present legislation covering use of chemicals in or on goods is protecting the public adequately, was affirmed by various speakers at the Inter-Industry Conference on Chemicals in Foods sponsored by the Manufacturing Chemists' Association, at the Statler Hotel, New York, January 15. A registration of nearly 600 was on hand for the all-day session.

Speakers representing many phases of the chemical and food industries appeared on the program with a wealth of statistical information on how the presence of chemical products in foods affects nutrition and health, and how best to regulate interstate movement of such products.

Talking on "Chemicals and Health," Dr. John H. Foulger, director of the Haskell laboratory of Industrial Toxicology of E. I. duPont de Nemours & Co., Inc., denied that the public is being faced by new hazards because of the chemicals being used in the production of food. He reviewed the five "cases" cited in the reports of the Commissioner of the Food and Drug Administration: the Jamaica Ginger Case; the Elixir of Sulfanilimide Case; the Lithium Chloride Case; the Monochloracetic Acid Case; and the Diethyl Stilbestrol Case.

After reviewing these, he pointed out that so far as the FDA reports show, no single death is known to have resulted, in the period surveyed, from the use in or on foods, of chemicals intended for such a purpose. He added, for contrast, that during the period of these reports (1939 through 1947), at least 250,000 persons were killed in the United States by accidents in the home. "Obviously, as a cause of injury or death to the people of the United States, food poisoning cases are a matter of small statistical weight," he declared. Carelessness of the type which causes housewives to mistake a pesticide for cooking ingredients, was the cause of nearly all accidents listed. "I do not think that anyone will suggest that legislation of any type can control human carelessness," he said.

Recalling that hundreds of persons in chemical plants and in similar employment have undergone regular checkups for years to find any chronic effect of such an environment, Dr. Foulger reported that the record is good. "We can say without equivocation," he declared, "as a result of accumulating experience in the field of industrial medicine in the chemical industry, that the general public does not face the hazard of new or unexplained or undiagnosable diseases as the result of repeated intake of small quantities of chemicals which may be used in production, processing or packaging of food."

He also pointed out that more rigid legislation is unnecessary. The total medical record of alleged injury caused by various chemicals of the type in question was summarized and from this record, said Dr. Foulger, "there is no evidence that the present Food, Drug and Cosmetic Act, operating with voluntary cooperation between the officials of the Food and Drug Administration and experts of the food and chemical industries, has failed to protect the public against injury from chemicals in their food. There is, therefore, no medical basis for claims that new and more rigid legislation is needed," he concluded.

Dr. Foulger struck back at "those enthusiastic supporters of the cry for new legislation," who, he said, "have tried to stampede sections of the American public by speeches or by magazine articles of doubtful accuracy and ridiculous arguments. We should point out that the apprehension or the actual fear which such speeches and articles engender, can be a much more potent cause of both mental and physical illness than any chemical used in the production or processing or packaging of the nation's foodstuffs," he asserted in conclusion.

Crawford Replies

THE viewpoint of the Food and Drug Administration on chemicals in foods was explained by Charles W. Crawford, F.D.A. Commissioner. He denied emphatically that the government is trying to hamper research, and declared that he, himself, had drafted the "Miller Bill"

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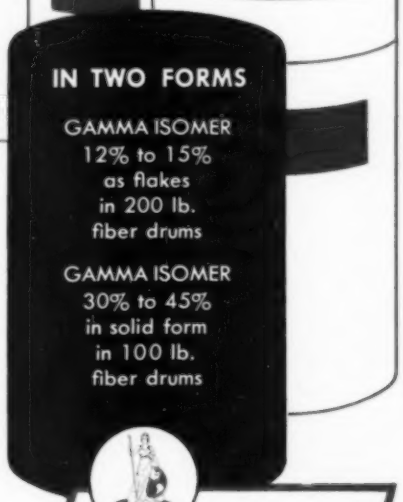

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at the request of The Delaney Committee. The bill is modeled along the lines of the law regulating the marketing of new drugs, he explained. In reviewing some of the provisions of the Act, he pointed out that the purpose is "to safeguard the nation's food supply so that the over-all quantity of toxic substances, in all the items that make up the varied diet characteristic of American people, will be held at safe levels."

The Commissioner said that the term "chemicals in foods" and other similar phrases all lack much in precision. "The real question," he said, "is on the use in food of any substance . . . when that substance has not been adequately tested, either through human experience or by all reasonably applicable laboratory and clinical procedures, to show either it is not poisonous or deleterious, or, if it is required in the production of a food, that it can be safely used." This, he explained, is aimed at the "fringe of the careless or ignorant or unscrupulous who have used or are now using chemicals in food without sufficient testing to be reasonably certain they will not impair the health of consumers."

Describing the provisions of the so-called "Miller Bill," H. R. 3257, Mr. Crawford told how it would handle the addition of nonessential chemicals in foods. He then explained how the law would operate in the case of insecticides, known to be toxic. "It is well recognized that the use of some poisonous or deleterious substance is required in producing these crops. The manufacturer tests the chemical by all reasonably applicable methods to determine the degree of its toxicity. He develops quantitative analytical methods for the chemicals in or on the foods, unless such methods already exist. He determines the quantities of the chemical remaining in or on the foods, as they are shipped in interstate commerce, when the chemical has been used on the crops at such times and in such quantities as will accomplish its insecticidal purposes.

"If he believes the investigation shows that such foods are safe for consumption, he submits his application to the Administrator, accompanied by reports of all his results. He will recite the directions he proposes to use in labeling or otherwise in marketing the article for use on specified food crops or groups of food crops, spraying or dusting schedules, and if necessary, precautions such as the latest date for safe application before harvest.

"If the Administrator agrees with him, his way is cleared to sell the chemical for use under the directions he proposed. Those who buy it and use it in accordance with these directions will be free to market those crops in interstate commerce. If someone uses it in greater quantities, that is the responsibility of whoever does so. Existing provisions of the law still apply, an authority to provide tolerances can be exercised. If someone wishes to use it for food crops other than those included in the directions, it is the responsibility of that person to submit an application covering such use."

If on the other hand, the Administrator believes that the data submitted by the manufacturer leaves a reasonable doubt that the foods will be safe, the procedure for notification, hearing and court review will become operative. This allows the applicant to do additional work on the point in question, if he wishes, or he can demand a formal hearing before the Administrator, at which a record will be made of all evidence on both sides. If the Administrator is still unconvinced, he issues an order refusing to permit the application to become effective. The applicant can appeal the order to the Federal courts, which have power to set it aside if it is unreasonable or arbitrary.

Bill Threatens Research

DR. F. N. Peters, Jr., vice-president in charge of chemical research for the Quaker Oats Co., Chicago, commented that "legislation giving the Federal Security Administrator power of life or death over new food products will result in loss of industry-incentives to support research, will decrease the amount of research, will lower the morale of research personnel and will progressively reduce the rate of progress in the food industry in the years to come." His talk, "Legislative Controls on Research and Development in Foods" brought out numerous points where adoption of the Miller Bill, H.R. 3257, would result in a disruption of research programs, stop progress in food production and destroy the freedom of management to use its judgment in adopting research findings.

Research workers would be forced to change their philosophy of searching, he warned. "All their ideas, all their efforts would be directed toward what would please the Administrator rather than toward what would be better in their own judgment. The judgment of a single man would be substituted for the free judgments of thousands and tens of thousands of research men throughout the country."

Dr. Peters warned further that if responsibility for the safety of every new food were to be placed on the Federal Security Administrator, such a burden would be too great to be borne by any individual. Under such a condition, the Administrator would take a negative attitude toward the introduction of any new product, and this adverse attitude would increase in proportion to the breadth of the new discovery. "Progress through research and a negative attitude toward change are not compatible," Dr. Peters declared. He also expressed doubt that a manufacturer could obtain relief from arbitrary rejection or from a completely negative attitude on the part of the Administrator.

MCA Proposal

AS a substitute for the Miller Bill, the MCA came up with recommendations of its own for legislation that would prohibit the use of chemical additives in or on food until sixty days after a notice of such intended use has been filed with the Food and Drug Administration. The

Monsanto's new soil conditioner increases yields

Demonstration plots are being planted this year to show how Krilium, Monsanto's new soil conditioner, improves tilth and increases yields. Krilium is not a fertilizer, but it improves soils so that crops use soil nutrients more efficiently.

The new soil conditioner mellows the soil and makes it easier to work. Its use results in better stands because seedlings break through more easily. Krilium-treated soils resist erosion. Evaporation from conditioned soil is 30% to 40% slower than from untreated land. Crops resist drought better when grown in Krilium-treated soils. Tests conducted in Miami Silt Loam show yield increases from 30% to 200%.

Monsanto plans to have Krilium available in commercial quantities for 1953. For further information on Monsanto's latest contribution to agriculture, write for literature. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second St., St. Louis 4, Mo.

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DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Canada Limited, Montreal.

KRILIUM

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presentation of the Association's position was made in a statement which concluded with a declaration that "The Chemical industry is determined that the many advantages resulting from the use of chemical products shall continue to be available to the American people. To achieve this end it is vital that the consuming public, the legislative bodies, and the regulatory agencies have an appreciation of the indispensability of the contribution of chemicals to food technology. There must be no unnecessary restraints upon further improvement of foods, or restraints which might even cancel gains that have already been made in the safety, economy and abundance of our food supply."

A legal panel along with discussions from the floor brought out further points in connection with the present law and the proposed changes. J. Philip Smith, Chas. Pfizer & Co., Inc., spoke on "The Present Law;" Fred Bartenstein, March & Co., Inc., "The Miller Bill:" G. J. Williams, Dow Chemical Co., "The MCA Proposals" and Marx Leva, of the law firm of Fowler, Leva, Hawes & Symington, Washington, D. C., spoke on "Comparisons and Conclusions."

A luncheon was held at the Statler at noon, with Sanford Hill, E. I. duPont de Nemours & Co., Inc., Wilmington, Del. as chairman. A talk on "The Challenge to Leadership" was made by Hans A. Eggerss, president, Continental Can Co.

In addition to the speakers mentioned, others appearing on the program included Sidney D. Kirkpatrick, McGraw-Hill Book Co., New York; Dr. Wilbur Miller, American Cyanamid Co., New York; Charles S. Munson, chairman of the Board, Manufacturing Chemists' Association; Mary I. Barber, food consultant to the Office of the Quartermaster, Battle Creek, Mich. "New Foods and Better Home Management;" George Garnatz, director, Kroger Food Foundation, Cincinnati, Ohio, "Progress in Food Quality;" and Dr. F. L. Gunderson, Pillsbury Mills, Inc., Minneapolis, "Improvement in Nutritive Value of Foods."★★

Delaney Witness Attacks Commercial Fertilizers

THE Select Congressional Committee to investigate effects of chemicals in and on foods, conducted hearings in New York City for four days in January. For the most part, the committee heard witnesses testify on chemicals used in cosmetics, but some testimony was recorded on chemicals in and on foods.

Leonard Wickenden, industrial chemist of Westport, Conn., commented pointedly on the use of commercial fertilizers in the production of agricultural crops. He attacked the entire commercial fertilizer setup from manufacturer to the farmer who applies the material, lauding at the same time, the methods advocated by organic proponents. The witness not only condemned the use of manufactured fertilizers, but labeled as untrue statements made previously before the Delaney Committee by Dr. Firmen E. Bear, Rutgers University and Dr. Richard Bradfield, Cornell University. The latter two, widely regarded as experts in their fields, had cited numerous instances where agricultural production had been stepped up through the application of commercial fertilizers. Mr. Wickenden took issue with these statements, declaring that there is no official proof of such increases. Instead, Mr. Wickenden declared that with some 11 million corn acres out of production, the average yield would be greater because the acres omitted from production would have been the poorest ones. In addition, the weather has a great deal to do with farm production. It is "the most influential" of all factors, he said, and this must be figured into the yield records. He also pointed out efforts of the U.S.D.A. and Soil Conservation Service in introducing contour plowing, strip cropping, irrigation, and better drainage, not to mention the initiation of hybrid corn.

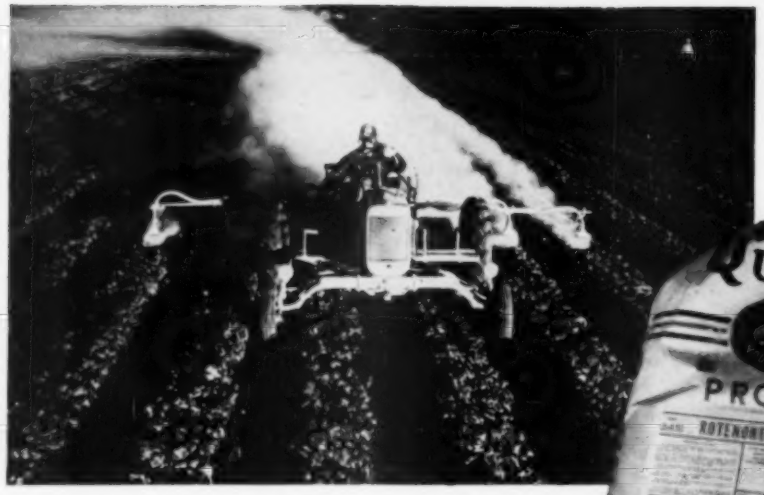
The witness decried commercial fertilizers because of their high solubility. Of nitrogenous fertilizers, he said "If their use is followed by heavy rain, they are washed into the subsoil, from there to the rivers and so out to sea—and the farmers' dollars go with them."

As for superphosphate, Mr. Wickenden had nothing but contempt. After pointing out the pitfalls of chemical reactions in the soil which render superphosphate even less soluble than untreated phosphate rock, and decrying the economies of producing and shipping superphosphate, he concluded that "the farmer pays a higher price for a product much poorer in phosphate than the untreated rock and one which compels him to add a contaminating compound which, in many cases, he would rather not have." The witness then added that "It seems obvious that the only people who benefit from the manufacture of superphosphate are the manufacturers."

Mr. Wickenden's testimony concluded with an intimation that research conducted in connection with a group of fertilizer people, is not to be trusted. He referred specifically to "some of the professors in our agricultural colleges" who are "employees" of the manufacturers, and because of this alliance, he questioned whether their teaching is "entirely unbiased."

He asked the Delaney Committee to introduce legislation "making it illegal for any person who receives compensation, in any form, from a source connected with the manufacture or sale of material or equipment used in agriculture, to hold, at the same time, any position on the staff of an agricultural college or of a state experiment station."

The committee adjourned on Jan. 15 and Mr. Delaney announced that public hearings were to be resumed in Washington, D. C., January 29 and 31. Subjects to be discussed at these sessions were to be on the possible relationships of chemical additives in food to the incidence of cancer and testimony was also to be heard on the use of stilbestrol in poultry.



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Niagara Chemical Division

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Industry Patents

2,557,814. Dispersing Insecticides as Vapors. Patent issued June 19, 1951 to John Merritt Dinsdale, Phyllis May Holmes and Pamela Ruth Martin, High Post, Salisbury, England, assignors to Waeco Limited, a British company. A composition for use in the generation of insecticidal smokes, comprising in admixture hexamine, potassium chlorate for providing oxygen for the combustion of the hexamine, the ratio of the weight of the potassium chlorate to the weight of hexamine being within the limits 0.75:1 and 1.0:1, and a thermally vaporisable halogenated organic insecticidal compound whose vapours are heat-decomposable, the ratio of the weight of the insecticidal compound to the combined weight of hexamine and potassium chlorate being within the limits about 2.3:1 to 3.5:1, whereby on combustion of the composition flaming and thus heat-decomposition of the heat-decomposable vapors is avoided.

2,557,815. Dispersing Insecticides or Other Pesticidal Compounds as Vapors. Patent issued June 19, 1951 to Edward Hanley Wheelwright, John Merritt Dinsdale, Phyllis May Holmes and Pamela Ruth Martin, High Post, Salisbury, England, assignors to Waeco Limited, a British company. Pesticidal smoke generating means having a container provided with an outlet at one end thereof, and a charge within the container, said charge comprising a self-combustible composition in admixture with a vaporizable pesticidal substance, said charge being formed in at least two layers having different compositions, the layer adjacent the outlet having a composition to form on combustion a porous bonded mass permitting the passage of vapours therethrough and generating a non-inflaming vapour, a layer remote from the outlet being arranged to generate on combustion an inflaming pesticidal vapor containing gas.

2,557,997. Defoliant and Herbicides. Patent issued June 26, 1951 to Richard L. Phelps, Canonsburg, Pa., and Jason M. Salsbury, Stamford, Conn., assignors to American Cyanamid Company, New York, N. Y., a corporation of Maine. The product obtained by reacting lime nitrogen with a member of the group consisting of sodium hydroxide and sodium carbonate, followed by drying and comminuting the resultant reaction mass, said product having superior herbicidal and defoliation properties over an equal amount of pure contained sodium acid cyanamide.

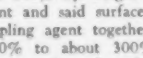
2,558,762. Carrier Material for Agricultural Chemicals. Patent issued July 3, 1951 to Donald A. Kohr, Jr., Chicago, Ill. and Roy L. Milde, La Fayette, Ind., assignors to The Sherwin-Williams Company, Cleveland, Ohio. A substantially water-free liquid composition capable of forming a stable dispersion in water for application to plant surfaces by spraying, comprising essentially a hydrocarbon spray oil containing a major proportion of paraffinic constituents and not more than about 25% sulfonable material and having a viscosity of from about 40 seconds to about 70 seconds Saybolt Universal at 100° F., a coupling agent, a surface active agent of the type obtained by reacting 3 to 6 mol proportions of ethylene oxide with 1 mol proportion of a monoalkyl ester of cyclic inner ethers of a hexitol in which the alkyl radical is a sraight chain 18 carbon atom fatty acid residue, said coupling agent effecting a mutual solvency between said spray oil and said surface active agent, the proportion of said surface active agent being from about 20% to about 200% by weight of the coupling agent and said surface active agent and coupling agent together being from about 20% to about 300% by weight of the spray oil, and at least one agricultural chemical miscible therewith suitable for application to plant surface by spraying in an amount of from about 2% to about 400% by weight of the remainder of the composition.

2,559,569. Manufacture of Benzene Hexachloride. Patent issued July 3, 1951 to Harold David Orloff, Detroit, Michigan, assignor to Ethyl Corporation, New York, N. Y., a corporation of Delaware. A process for the manufacture of benzene hexachloride comprising reacting chlorine and benzene in the dark in the presence of an organic peroxide and an amine under liquid phase conditions at a temperature between 20° and 80° C.

2,560,626. Insecticidal and Fungicidal Spray Oil. Patent issued July 17, 1951 to Clifford L. Boissonou, Concord and William J. Yates, Martinez, Calif., assignors to Shell Development Company, San Francisco, Calif., a corporation of Delaware. A water-emulsifiable insecticidal spray oil composition comprising a predominant amount of a horticultural hydrocarbon spray oil having dissolved therein between about 0.01 % and about 5 % by volume of a fatty acid monoester of a polyalkylene glycol and a solubilizing amount of an oil-soluble unsubstituted alkyl phenol, said ester having between about 14 and about 60 carbon atoms in the glycol portion and between about 12 and about 30 carbon atoms in the acid portion.

2,561,209. Hydrogenated Dicyclopentadiene Insecticide. Patent issued July 17, 1951 to Allen R. Kittleson, Cranford, and Louis A. Mileska, Westfield, N. J., assignors to Standard Oil Development Company, a corporation of Delaware. An insecticidal composition comprising a polychloro tetrahydrodicyclopentadiene containing from 50 to 75 % by weight of chlorine, said product being contained by completely hydrogenating dicyclopentadiene in the presence of a hydrogenation catalyst, followed by chlorinating the hydrogenated product with elemental chlorine to substitute chlorine atoms for hydrogen atoms to the indicated chlorine range in the presence of ultra-violet light at a temperature in the range of 0° to 100° C., admixed with a dispersing agent which lowers the surface tension of water and thereby promotes aqueous colloidal emulsions of the polychloro tetrahydrodicyclopentadiene.

2,562,011. Herbicidal Compositions and Application Thereof. Patent issued July 24, 1951 to Luther L. Baumgartner, Hastings on Hudson, N. Y., assignor to The B. F. Goodrich Company, New York, N. Y. A herbicidal composition comprising from 0.1% to 15% by weight of a compound having the formula:



where M is an alkali metal and A is a hydrocarbon radical selected from the group consisting of alkyl and isopropyl, as the essential active ingredient, and from 0.01% to 1.0% by weight of a dispersing and emulsifying agent.

2,564,249. Fungicidal Compositions Containing Alkylcyclohexylmethyl-pyridine. Patent issued August 14, 1951 to Francis E. Cislak, Indianapolis, Ind. A fungicidal composition comprising an organic solvent and an alkylcyclohexylmethylpyridine.

Trade Mark Applications

Safe-lex, in block capitals, for insecticide, Filed July 22, 1949 by Bostwick Laboratories, Inc., Bridgeport, Conn. Claims use since March 1, 1949.

Skidoo, in block capitals with letters increasing in size to the letter D and then decreasing in size again, for insecticides. Filed May 12, 1948 by Continental Merchandise Corporation, Chicago, Ill., assignor to M. H. Jacobs, Inc., Chicago, Ill. Claims use since March 8, 1948.

Warfarat, in capital block letters, old style, for rodenticide. Filed September 19, 1950 by Dr. Hess & Clark, Inc., Ashland, Ohio. Claims use since August 31, 1950.

Early Frost, in block capitals, for herbicide. Filed October 14, 1950 by Shell Chemical Corporation, New York, N. Y. Claims use since August, 1950.

Early Frost, in capital letters with frosted appearance, for defoliant and herbicide. Filed January 13, 1951 by W. H. Barker Co., Chicago, Ill. Claims use since May 1, 1950.

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The Listening Post

Selection and Application of Fungicides

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

THE proper selection and application of fungicides contributed greatly to the success of the National Plant Disease Warning Service in 1951. Information concerning the various fungicides applied in the form of sprays and dusts, their concentration, the percentage of growers using them, and the results obtained for the three crop diseases is presented in the four following tables.

TABLE 1
CONTROL OF LATE BLIGHT ON TOMATO: Materials used as Sprays and Dusts and their effectiveness, 1951.

State	Materials	Concentration	Percent Growers using	Results
SPRAYS:				
Ala.	Nabam	2 qts.-¾ lb. $ZnSO_4$-100	1	
	Zineb concentrate	2 lbs.-100 gals.	.05	
Conn.	COCS	4-100	Unknown	All gave good control.
	Tribasic	"	"	
	Copper A	"	"	
	Bordeaux	"	"	
Del.	Zineb	2 qts.-1-100 or 2-100	80	Good all season.
	Tribasic	3-100	30	Good } August ap-
	Bordeaux	6-3-100	30	Good } plication only.
Fla. (Dade Co.)	Nabam + $ZnSO_4$	2-1-100	80	Good to excellent.
	Zineb	2-100	20	" " "
Ill.	Dithane D-14 + $ZnSO_4$	2 qts.-1 lb.-100	70	Where fungicides were applied before late blight became too severe, all materials gave good to excellent control with the exception of Zerlate.
	Zerlate	2 lbs.-100		
	Fixed coppers	4 lbs.-100		
	Parzate (dry)	2 lbs.-100		
	Dithane Z-78	2 lbs.-100		
	Bordeaux mixture	?		
Md.	Z-Z-T-T-T	2 lbs. & 4 lb.-100 gal.	50	Good
	Dithane Z-78	2 lbs.-100 gal.	25	Good
	Dithane D-14 + $ZnSO_4$	2 qts.-1 lb.-100 gal.	25	Good
Mich.	Alternating copper and Zerlate	Usual		Good
	Tank mix copper and Zerlate	"		Good
	Dithane	"		Good in southeastern area; poor in southwestern.
Miss.	Copper A	4-100		
	Parzate	2-100	85	
	Tribasic C.S.	4-100		
	Dithane Z-78			
N. H.	Neutral copper		Very few	Fair

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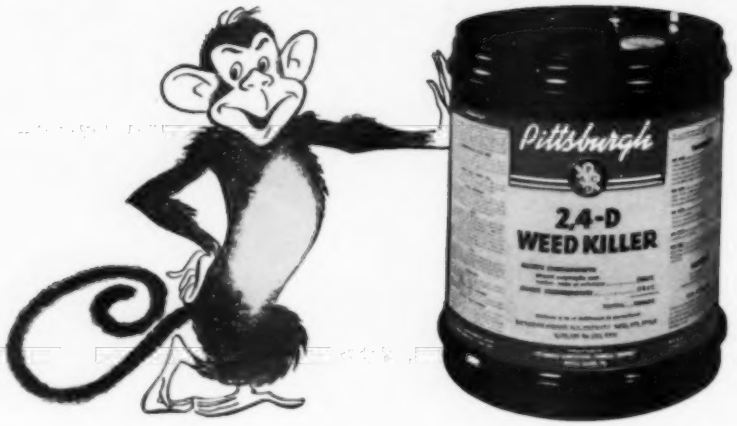
(Table 1 continued from page 65)

State	Materials	Concentration	Percent Growers using	Results
N. Y.	Zerlate—bordo	2, 8-4-100	70-80	Excellent
	Zineb	2-1-100	10-15	Excellent in 1951.
N. C.	Fixed coppers	2 lbs./100	15	Good
	Carbamates	2/100	5	Fair
Pa.	Fixed copper	4 lbs. of 50%	Est. 70	Very good
	Bordeaux	6-3-100		
		8-4-100	15	Excellent
	Zineb		5	Good
S. C.	Nabam	2-1-100	3	No disease
Va.	Copper	2 lbs.-100 gal.	10	Not enough late
	Zineb	1½ lbs.-100 gal.	1	blight to judge efficacy of sprays.
W. Va.	Zineb	2½ lb.-100	10	Excellent
	Bordeaux mixture	8-8-100	10	Good
	Fixed coppers	2 lb.-100	10	Good
Wis.	Copper A	6 lb.-100 gal.	75	Poor
	Carbamates	2-3 qts.-100 gal.	Very few	?
DUSTS:				
Ala.	Zineb	6%	33	
	Tribasic copper	6%	12	
Ark.	Tribasic copper sulfate	7% Cu.	Less than 1	No blight where used.
	Dithane Z-78	6%	Less than 1	No blight where used.
Conn.	Fixed copper	8% Cu.	?	Fair control until late Sept. when dusting was stopped.
Del.	Tribasic		10	Fair
	Zineb			Fair
Ill.	Fixed coppers	7% Cu.	6% where dusting service available	See Remarks under Sprays.
Md.	Ziram	10%		Fair
	Fixed coppers	7%		
Mich.	Tribasic copper			Good
Miss.	Copper A	12%		
	Parzate	"		
	Tribasic copper sulfate	"		
	Dithane Z-78	"		
N. C.	Fixed coppers	7% Metallic Cu.	75	Good
	Carbamates	6% active	5	Fair
N. H.	Neutral copper		Very few	Fair
N. Y.	Zerlate-copper	10%-7%	5	Poor
Pa.	Fixed copper	7%	10	Fairly good
S. C.	Fixed copper	6-6 ½% Cu.	50	
Va.	Copper	6%	Few	
W. Va.	Zineb	6½%	15	Excellent
	Fixed coppers	6-7%	20	Good
	Copper-lime	20-80	10	Good
Wis.	Copper	7%	10	Poor

TABLE 2

CONTROL OF LATE BLIGHT ON POTATO: Materials used as Sprays and Dusts and their effectiveness, 1951.

State	Materials	Concentration	Percent Growers using	Results
SPRAYS:				
Fla. (Dade Co.)	Nabam + Zinc sulfate	2-1-100	100	Excellent
Minn.	Dithane & Parzate coppers		95	Poor to good
Nebr.	Dithane		2	Good
	Parzate		1	"
	Fixed copper		1	"
N. H.	Neutral copper	6 lbs.-100 gal.	45	Good-
	Dithane, Parzate		5	Good
Pa.	Zineb	2 qts. liquid + 1 lb. zinc sulfate	60	Good through season; not up to copper at end for storage rot
	Bordeaux	8-4-100	40	Good in all stages
	Fixed copper	4 lbs. of 50%	10	Good
	Crag 658	2 lbs.	Few	Good
S. C.	Nabam	2-1-100	1	
W. Va.	Zineb	2½ lbs.-100	5	Excellent
	Bordeaux mixture	8-8-100	10	Good
	Fixed coppers	2 lbs.-100	5	Good



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(Table 2 continued from page 67)

State	Materials	Concentration	Percent Growers using	Results
Wis.	Carbamates	2 qts.-100-1 acre	?	Excellent to good
	Copper (fixed)	4-6 lbs.-100-1 acre	?	Excellent to good
	Bordeaux	8-10 lbs. 5-6 lbs.-100 gals.	?	Excellent to good
	Copper zinc chromate	2 lbs.-100-1 acre	?	Poor when 2 lbs. per 100 gal. used; 3-4 lbs may give good control.
DUSTS:				
Minn.	Dithane, Parzate } Fixed coppers }		95	Poor to good Depending on care in application and weather
Nebr.	Dithane		1	Fair
N. H.	Neutral copper	7% Cu.	45	Good
Pa.	Copper	20-80%	Few	
S. C.	Fixed copper	6-6½% Cu.	50	
	Zineb	4%	5	
W. Va.	Zineb	6½%	15	Excellent
	Fixed coppers	7%	20	Good
	Copper-lime	20-80%	5	Good
Wis.	Copper	7%		

TABLE 3

CONTROL OF BLUE MOLD OF TOBACCO: Materials used as Sprays and Dusts and their effectiveness, 1951.

State	Materials	Concentration	Percent Growers using	Results
SPRAYS:				
Md.	Fermate	2-100	50	Good
N. C.	Fermate	4-100	27	Good
	Dithane Z-78 or Parzate	3-100	3	
Tenn.	Ferbam	76% material, using 5 tablespoons/gallon	Est. 20	Good
	Zineb	65% material, 2½ tablespoons/gallon	Very few	
	Fermate	4 lbs.-100 gal.	40	Excellent
	Dithane	3 lbs.-100 gal.	5	Good
Va.	Ferbam	3-4 lb.-100 gal.	75	Excellent
	Zineb	2 lbs.-100 gal.	Few	"
DUSTS:				
Fla.	Ferbam	15.6%	40	Good
	Zineb	6.5%	40	Excellent
Md.	Fermate	15%	50	Good
N. C.	Fermate	15%	30	Good
	Dithane Z-78 or Parzate	10%	5	Good
Tenn.	Ferbam	10%	15	Good
	Zineb	5%	15	Good
	Fermate	10%	25	Excellent
	Dithane	5%	5	Good
Va.	Ferbam	10%	15	Excellent
	Zineb	6%	Few	"

TABLE 4

CONTROL OF DOWNY MILDEW OF CUCURBITS: Materials used as Sprays and Dusts and their effectiveness, 1951.

State	Materials	Concentration	Percent Growers using	Results
SPRAYS:				
Fla.	Nabam + zinc sulfate	2-1-100		Excellent
	Zineb	2-100		"
S. C.	Nabam	2-1-100	5	
Va.	Copper	1½ lb.-100	Few	
	Zineb	1 lb.-100	"	
DUSTS:				
N. C.	Fixed copper (Tribasic)	5%	15	Poor to good
	Carbamates	6%	2	Poor to fair
S. C.	Fixed copper		38	Disease appeared late after dusting and spraying stopped and when harvest completed.
	Zineb		30	
	Ziram		2	
Va.	Copper	5%	Few	
	Zineb	6%	"	

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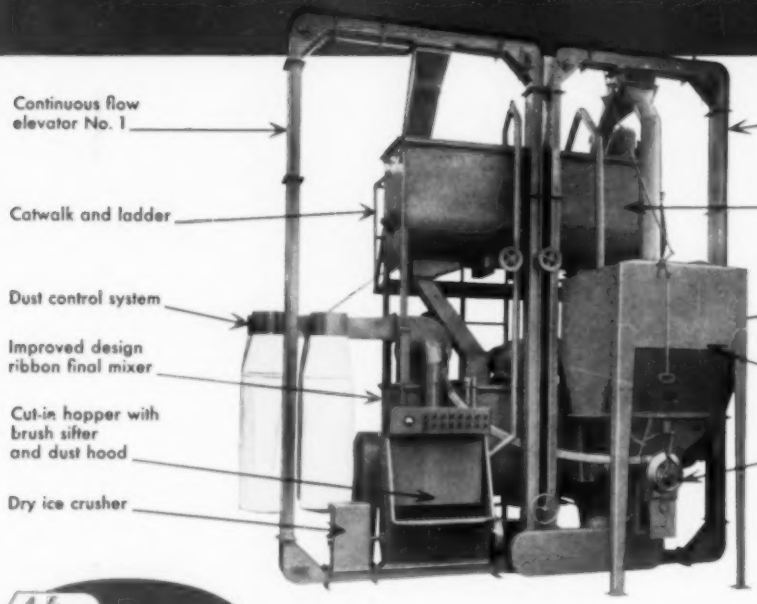

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* * * * * * *

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R. T. R. (*Ready to Run*) Uni-Blendor equipment is designed by engineers who are recognized specialists upon insecticide processing. The units, which incorporate all of the advantages of individually designed plants, require less capital investment in equipment, eliminate the expense of remodeling buildings, avoid delays in installation, disappointments in operation and production—all of which frequently are involved in individually designed equipment.

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Insect Situation During Winter Months

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is connected with the department of Insect Pest Survey and Information, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

COLD weather and seasonal conditions, during the latter part of December and early January, retarded insect activity to such a degree that very little crop injury was reported. Southern Florida was the only area reporting bean insect activity. Leaf miners were numerous to serious in Dade County. Light to moderate bean leaf roller populations were present in the Everglades section.

The green peach aphid, generally in light numbers, was reported on spinach and cole crops in Virginia, on kale, other crucifers, and spinach in South Carolina, and on collards and cabbage in Georgia and Florida. Cabbage and turnip aphids were reported from Virginia, South Carolina, Georgia, and Florida. A serious vegetable weevil outbreak in turnips was reported from Newberry County, South Carolina. In Georgia this insect was fairly abundant on turnips, and appeared to be on the increase. In northwest Florida the weevil was abundant on turnips and feeding to a limited extent on cabbage, collards, and other cole crops.

Leaf miners were numerous to serious on the extensive acreage of tomato and potato plantings in Dade County, Florida where a serious outbreak is anticipated. Although infestations of cabbage caterpillars were present in Virginia, South Carolina, Georgia, and Florida no serious injury was reported. The two spotted cucumber beetle caused slight injury to spinach in the Charleston, South Carolina area. Some cole cricket activity was reported from Florida.

Infestations Expected

A SURVEY on small grain insect conditions in Texas, Oklahoma, and Kansas was conducted by the Division of Cereal and Forage Insect Investigations, Bureau of Entomology and Plant Quarantine and personnel of the three State Experiment Stations during August, September, October, and November. During this survey, greenbugs were found in August on volunteer grain in two fields near Hereford, Deaf Smith County, Texas.

Other observations in Texas the same month showed greenbugs on volunteer wheat in Floyd and Motley Counties. In late October and early November, these insects were found in Wichita, Hardeman, Gray, and Parmer Counties. However, during the October and November observations, only five of twenty-four fields examined were found to be infested.

Greenbugs were found on volunteer wheat in Pawnee County, Oklahoma, in early October and in Kay and Caddo Counties the latter part of the month. Moderate populations were found in two Osage County fields in November.

No infestations were found in the Oklahoma Counties of Tillman, Kiowa, Washita, Custer, Blaine, Major, Dewey, Woodward, Harper, Cotton, Comanche, Oklahoma, Canadian, Kinkfisher, or Logan during October inspections.

During early September and in October, greenbugs became numerous enough to cause damage in Riley County, Kansas. Infestations were observed in late September in Barton, and during October in Graham, Sheridan, Thomas, and Wichita Counties. Other infestations were reported from Clay, Cowley, Marion, Dickinson, and Geary Counties.

The crown aphid was found as early as September 23, 1951, in the Garden City, Kansas areas. This insect was also found in every field examined in Western Kansas during late October.

The two-spotted and the brown wheat mite were found in a few volunteer fields in Sherman County, Kansas and north of Garden City, Kansas in late October.

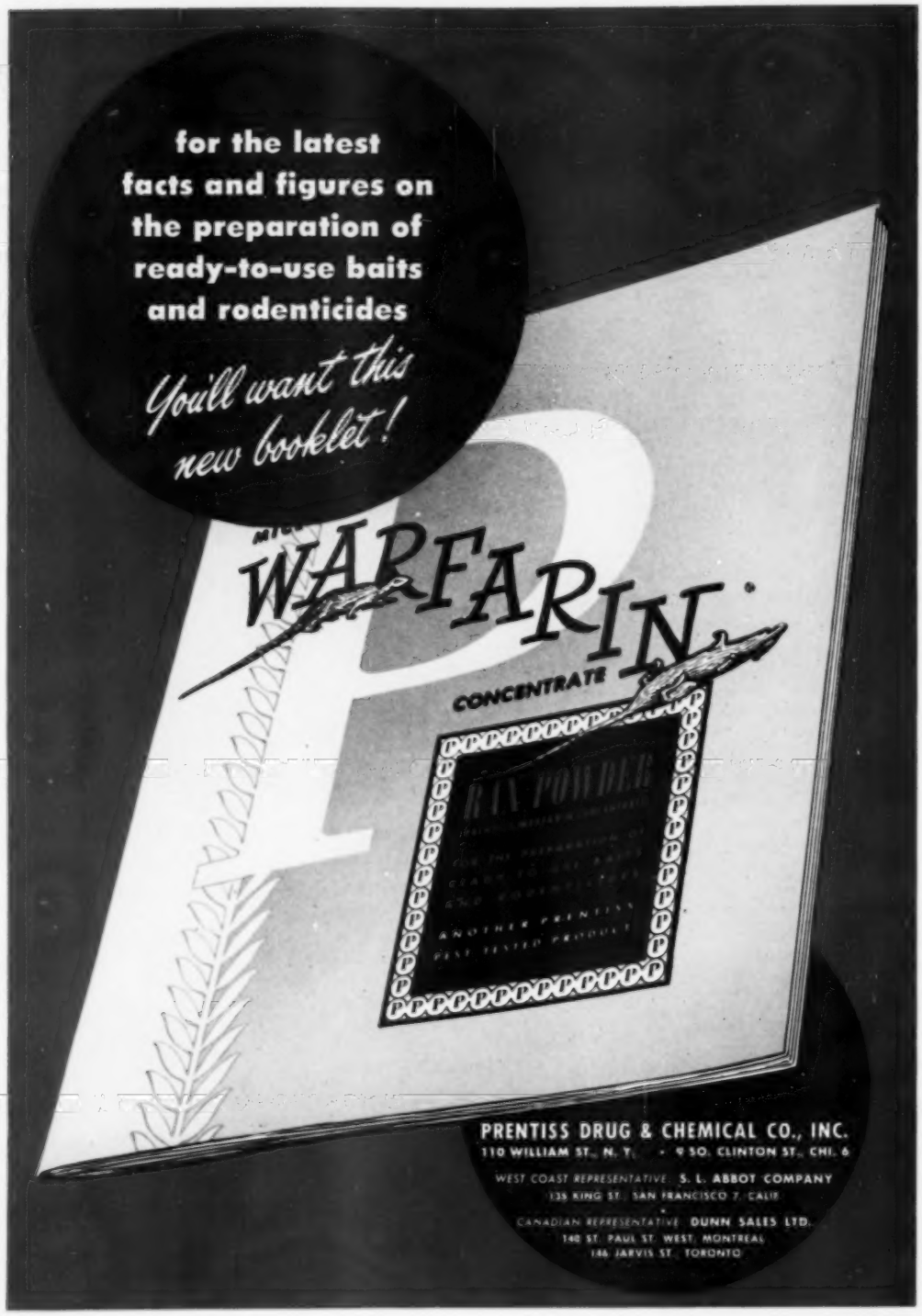
Leafhoppers were found in several grain fields in the Texas Panhandle and western Oklahoma as well as Trego, Gove, and Thomas Counties, Kansas during late October.

Flea beetles were first reported in western Kansas the week of September 24. In September and October they caused damage in Greeley, Stanton, Haskell, Gray, and Meade Counties. Damage caused by the insect during the latter part of October was also reported from the Texas Panhandle. The pest was also found in several western Oklahoma Counties but no serious damage was reported.

The lesser cornstalk borer was reported as causing serious damage to wheat in sections of Oklahoma during early October. A survey in Kiowa, Washita, Blaine, Custer, Major, Dewey, and Woodward Counties revealed some injury. The most serious injury appeared to be on sandy upland soil in Washita, Custer, Blaine, and Major Counties.

Wire worms (including false wire worms) were found in several western Oklahoma fields during October. They were particularly abundant in Custer and Blaine Counties.

In early October white grubs were found to be rather abundant in several Tillman County, Oklahoma fields. Hessian fly was found during late October to be present in the following Kansas Counties: Ellis, Trego, Graham, Sheridan, Thomas, Sherman, Wallace, Greeley, Wichita, Scott, Eastern Hodgeman, Pawnee, and Rush.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Suppliers' Bulletins

New Pyrethrum Synergist

"Sulfoxide-Pyrexcel," a pyrethrum extract synergized with n-octyl sulfoxide of isosafrole, is being offered by S. B. Penick & Co., New York. The company points out the timeliness of this offering, due to insufficient supplies of natural pyrethrum.

Tests have indicated good knockdown and kill for the product. It is said also to have a mild odor, light color and low cost. The product is of the same low order of toxicity as pyrethrum extract and is effective in sprays against flies, roaches, Mediterranean flour moth, Indian meal moth and confused flour beetle. A technical bulletin describing the product is available from the company, 50 Church street, New York 7, N. Y.

•

Safety Fabric Announced

Literature describing "Dynel" fabric has been issued by Mine Safety Appliances Co., Pittsburgh, Pa. The new bulletin No. CF-28, describes safety work clothes made of "Dynel", said to be resistant to acids, caustics, moths, mildew, shrinkage, snagging and tearing. Such clothes are available in shirts, trousers, and coveralls. It is pointed out by the makers that the fabric itself is chemical-resistant, and that this property is not added by a chemical treating process. Write for bulletin CF-28, care of the company, Thomas & Meade Sts., Pittsburgh 8, Pa.

•

Tilghman Issues Booklet

Wm. B. Tilghman Co., Salisbury, Md., publishes a bi-monthly brochure, "The Tiller," which is sent to farmers and others in its trade area. Termed "A Journal for the Country Home," the eight-page November-December issue contained household hints, information on weed and insect control, a travelogue, a feature about a Delaware farm family, a prize-winning essay on soil conservation and historical sketches. The Tilghman company is the oldest firm in Salisbury, having been organized originally in 1863 under the name of Humphreys & Tilghman.

•

Acid-resistant Gloves

"Hyflex" gloves, a new line of plastic-coated gloves made to protect against water, acids, alkaline materials, oils and a variety of other corrosive chemicals, have been placed on the market by Houghton Laboratories, Inc. The product is canvas coated with a vinyl plastisol.

The gloves are said to be exceptionally flexible over a wide temperature range—from freezing to as as high as 200°F. They are recommended by the manufacturer for all-around industrial work, especially chemical processing and material handling.

Literature is available from Houghton Laboratories, Inc., Dept. 3A, Olean, New York.

•

Lift Trucks Described

Raymond Corporation, formerly Lyon-Raymond Corp., Greene, N. Y., has issued a bulletin #207, decribing its line of hydraulic lift trucks, pallet trucks and high lift trucks suitable for transporting and placing in storage, bagged materials. Write to the company, 27686 Madison St., Greene, N. Y. for the bulletin.

•

Nopco Offers Booklet

Full information on its line of emulsifiers is available from Nopco Chemical Co., Harrison, N. J. Its products are recommended for the formulation of toxaphene, chlordane, BHC and aldrin.

According to the makers, the product offers hard and soft water emulsion stability, anti-corrosive properties and low-cost production of long-life insecticides, larvacides and fungicides. Write for information on "Nopco 1219-A", Nopco Chemical Co., Harrison, N. J.

New Catalog for Spreader

Hercules Steel Products Corp. has prepared a catalog on its line of fertilizer spreaders, which, it is claimed, *spread* the material rather than throwing it over a given area. The units are said to give accurate quantity control from 200 pounds per acre to 8,000 pounds. All types of agricultural limes and fertilizers, dry or moist, can be applied with this equipment, the makers state. Write for further information on the new Hercules spreader, to Hercules Steel Products Corp., Dept. 104, Galion, Ohio.

•

New Turf Fungicide Out

A new turf fungicide, "Calocure", has been developed by Mallinckrodt Chemical Works, St. Louis, Mo. The company says the product promises effective control of brown patch. It is a formulation of mercury chlorides with additives increasing their fungitoxicity. The material was developed in cooperation with the Rhode Island Agricultural Experiment Station. More information is available from the company.

•

Chemical Pumps Offered

Eco Engineering Co. has developed a new line of chemical process pumps for small volume process or laboratory work and in transfer applications to pilot plant and industrial applications. The pumps are made of stainless steel. The makers say that the pump operates in either direction in capacities from 1 to 20 GPH and under pressures up to 40 PSI. Write for information to the company, 12 New York Ave., Newark 1, N. J.

•

Dust Collecting Explained

"Don't let Dust be your Destiny" is the title of a new 16-page booklet issued recently by Pulverizing Machinery Co., makers of the "Mikro-Collector" dust control equipment. The booklet pictures a number of actual installations in chemical plants where the equipment is used for ultra-fine grinding and collecting the dust. Also pictured are the "Mikro Air Conveying System,"

(*Turn to Page* 109)

Technical Briefs

Antibiotics in Soil

To determine whether antibiotics take part in the antagonism of microorganisms toward each other in soil, one must determine whether such materials persist under these conditions. In normal soils the diverse microflora degrade many antibiotics; chloromycetin is stable in sterile soil but is rapidly inactivated in nonsterile soil. At the high concentrations of 50 μgm. per gm. of soil there was an initial 24-hr. lag period followed by a rapid decline to 43 per cent at 72 hrs. and to 15 per cent after 2 weeks. The degradation is fairly complete, for no inactive aryl nitro compounds or aryl amines could be detected in the soil. Similar studies with clavacin indicate that the microflora of soil will rapidly inactivate this compound. At 48 hrs. no antibiotic could be detected in concentrations above the sensitivity of the assay. In the sterile control soils the concentration of clavacin was not reduced even after 7 days. Actidione also is unstable in soil; within 11 days' incubation 92 per cent of the actidione could not be recovered from nonsterile soil and 53 per cent was unaccounted for in sterile soil. Basic antibiotics such as streptomycin and streptothricin are inactivated by the clay, the organic matter, and the microflora of soil.

—Summary of "The Disappearance of Antibiotics from Soil," by David Gottlieb, before December meeting of American Phytopathological Society, Cincinnati, Ohio.

•

Fungitoxicity is Studied

The compounds involved are difficult to assess properly because of easy interconvertibility, e.g., between sulfur and hydrogen sulfide, low solubility and high volatility, e.g. carbon disulfide. Hence, their fungitoxicity has been reexamined by technics designed to overcome some of these handicaps. Studies were made with spores of *Sclerotinia fructicola, Glomerella cingulata, Aspergillus niger, Neurospora sitophila, Cephalosporium acremonium, Alternaria oleracea, Rhizopus nigricans,* and *Stemphylium sarcinaeforme*. Physical form of sulfur is most important; colloidal sulfur had LD50 values from 0.1 to 150 p.p.m. depending on the species, whereas wettable sulfur was nontoxic to all except *Sclerotinia*. For most species hydrogen sulfide was less toxic than colloidal sulfur. Ferbam was more toxic than ethylene diamine or dimethylamine; carbon disulfide was relatively nontoxic. Eight strains of *Neurospora crassa* exhibited a similar order of sensitivity to wettable sulfur and ferbam. However, the dosage response curves are much steeper for ferbam. Concentrations of sodium arsenite, found in other tests to stop completely the production of hydrogen sulfide by spores from sulfur, when added to sulfur did not decrease its toxicity. These results indicate that the role of hydrogen sulfide in sulfur toxicity is less than previously supposed.

—"Fungitoxicity of Compounds Possibly Concerned in the Mode of Action of Sulfur and Ferbam," summary of paper by S. E. A. McCallan, L. P. Miller and R. M. Weed, before Cincinnati meeting of APS in December.

•

Systemic Effects Noted

Studies have been carried out involving the translocation of three organic phosphate insecticides in plants. The compounds were octamethylpyrophosphoramide (OMPA), O,O-diethyl O-p-nitrophenylphosphate (para-oxon) and parathion. Incidental to the study of the movement of the compounds within plants the actual toxicity to mosquito larvae was determined for OMPA and para-oxon. Concentrations of 0.016 and 1 p.p.m. of para-oxon and OMPA, respectively, were effective at the LD 90 level of mortality.

Although parathion and para-oxon were effective on mites by toxicity of their vapors, OMPA was by far more effectively translocated in broad bean plants. The toxic effect of OMPA persisted for more than 4 weeks while parathion and para-oxon were effective for only 12 to 14 days. When spray or droplet applications of the chemical were made on leaves of the broad bean plant the movement of the compounds in the plants, as indicated by toxicity to mites and toxicity of extracts from the leaves, was greater in the downward direction. An estimated maximum of 40 per cent of OMPA or an active toxin and 7 per cent of para-oxon or an active toxin was present in unsprayed leaves 12 days after spray application. The translocation of the toxins was found to be greatest in actively growing young plants.

The absorption and translocation of OMPA and para-oxon appears to bring about certain chemical changes in the plants which are similar to those produced by the herbicide 2,4-D and related compounds. These changes include an increase in the carbohydrate content of the plants by both compounds, and by OMPA an increase in the nitrate composition of beans and peas. Para-oxon was not tested for this relationship with nitrates. The effects obtained were also more pronounced in plants growing in sunlight as contrasted to those kept in the dark.

—Summary of paper, "Effects Associated with Toxicity and Plant Translocation of Three Phosphate Insecticides," by M. M. I. Zeid and L. K. Kuthomp, Univ. of Minnesota, St. Paul, in *Journal of Economic Entomology*, Vol. 44, No. 6, December, 1951.

•

Soil Fungicides

The need for an effective nonphytotoxic soil fungicide is obvious. A rapid laboratory screening test was developed that gives good correlation with results in greenhouse and field. Chemicals are applied to soil in shell vials, with soil type, moisture, temperature, and inoculum standardized. Minimum requirements: penetration of 1 in. of soil in concentration sufficient to kill

How do you measure the look in a puppy's eye?

The preliminary precautions have been taken. A well-recommended kennel. A healthy litter. A breed that takes well to youngsters.

Now it's up to the boy to choose.

How will he decide? Perhaps by the look in a puppy's eye.

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*August, 1951 research study.

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the test fungus when the chemical was applied as a surface drench at a dilution of 1:500. Three of 40 fungicides passed the screening test: "Dithane D-14" and "Parzate" liquid (nabam), "Vancide 51," and "Dowicide G." All other commercial fungicides tested were ineffective, including the organic mercurials, insoluble dithiocarbamates, quinones, hydroxy-quinolines, soluble quaternary ammonium compounds, copper sulfate, "Orthocide 406," "Crag 658," "Karathane," and "Dowicides A. B. and C." "Dithane D-14" was the most effective soil fungicide tested, killing the test fungus (*Phytopthora cinnamomi*, root pathogen of many woody hosts) at a dilution of 1:2500 (1:13,150 active). "D-14" drenches (1:500) reduced the population of *Phytopthora* with no injury to avocado seedlings in the greenhouse; 1:250 eliminated the fungus but was slightly phytotoxic. Monthly and bimonthly irrigations of avocado trees in the field with "Dithane D-14" during the past two seasons markedly reduced the population of *Phytophthora;* it increased in the intervals between treatments but remained consistently lower than that of controls.

—Abstract of paper presented at the Cincinnati meeting of the American Phytopathological Society, December, 1951. "Evaluation of Soil Fungicides for Control of *Phytophthora cinnomomi,*" by George A. Zentmyer.

•

Toxicant Persistence Test

The persistence of various chlorinated hydrocarbon insecticides applied to turf for control of larvae of the Japanese beetle (*Popillia japonica* Newm.) was determined by means of bioassays and chemical analyses of the treated turf. In the bioassays larvae of *Popillia japonica* and adults of *Macrocentrus ancylivorus* Roh. were used as the test insects. The turf samples were taken from treated plots in eight localities in Massachusetts, Connecticut, New Jersey, and Pennsylvania.

The close agreement between the chemical and biological determinations of residues of DDT, TDE, toxaphene, and chlordane suggests that the composition of these toxicants did not change significantly while they were in the turf.

The percentage loss of DDT and chlordane in the turf was usually much the same in plots receiving widely different amounts of toxicant. The chlordane decreased more rapidly than the DDT—to 30 percent of the amount applied in 1-¼ years whereas this percentage of DDT still remained after 6 years. After 40 months 46 percent of the toxaphene and 44 percent of the TDE remained, and after 12 months 67 percent of the dieldrin and 33 percent of the aldrin.

—"Persistence of Chlorinated Hydrocarbon Insecticides in Turf Treated to Control the Japanese Beetle," by Walter E. Fleming, Warren W. Maines, and Leon W. Coles, U. S. Dept. of Agriculture, USDA Bulletin E-829, November, 1951.

•

Toxaphene, Chlordane Test

Seventeen heifers and young cows weighing from 500 to 800 lbs. were fed varying amounts of bran grasshopper baits containing toxaphene and chlordane.

The results indicate that cattle may develop toxic symptoms as a result of eating 4 to 10 lbs. of bran containing 0.68 percent toxaphene, and that more than 10 lbs. will cause fatal poisoning. In terms of toxaphene toxicity, the sub-lethal toxic doses were between 35 mg and 110 mg per kilogram body weight, while the lowest lethal dose was 144 mg per kilogram.

The chlordane bran, containing 0.34 percent chlordane, produced no symptoms in doses up to 13 lbs. Sixteen pounds produced symptoms, and one fatal case resulted from feeding 3.5 lbs. of a double-strength bait containing 0.74 percent chlordane. In terms of chlordane toxicity, no symptoms were produced by doses up to 52 mg per kilogram body weight; 91 mg per kilogram was toxic; and in one case 129 mg per kilogram was fatal.

—Bulletin 477, "Toxicity to Cattle of Chlordane and Toxaphene Grasshopper Baits," Montana Agricultural Experiment Station, Bozeman, Mont.

•

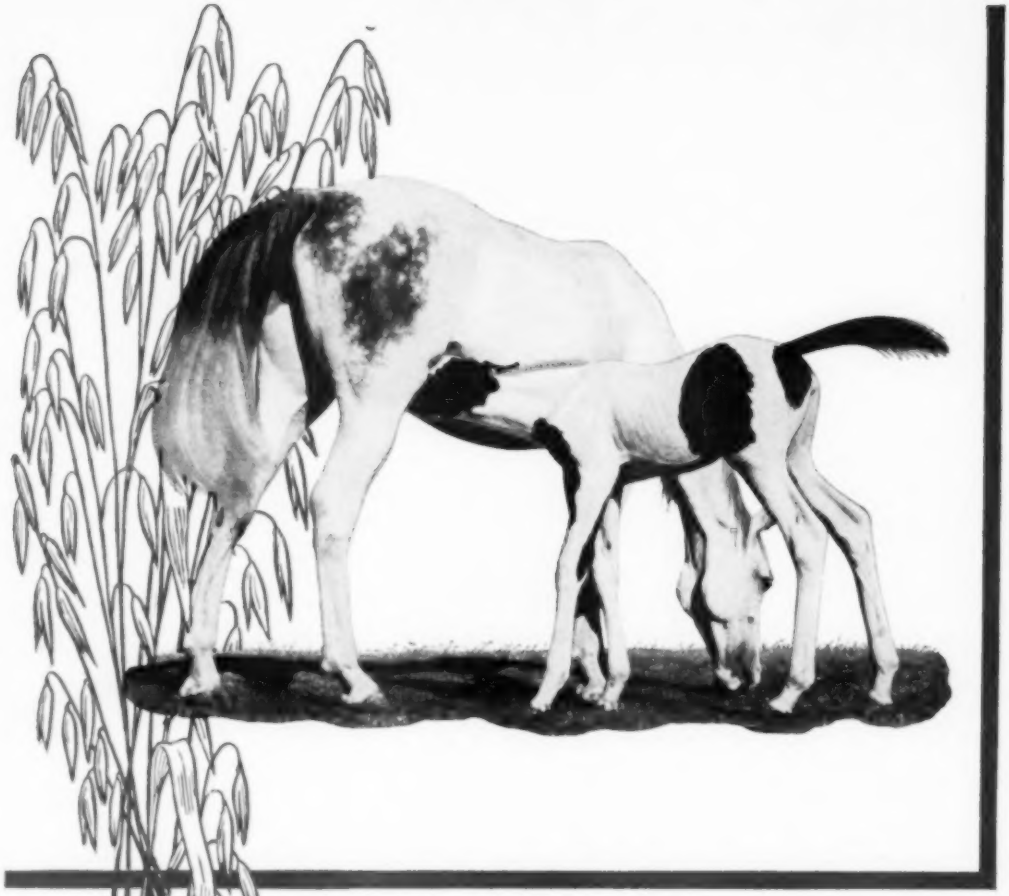
DDT on Truck Crops

Field experiments to determine the direct effect of DDT on the plant growth and crop yield when applied to the foliage of various vegetable crops were conducted at Beltsville, Md., from 1945 through 1948. Studies were also made to determine whether any of the DDT applied to the foliage is absorbed and translocated to the edible portions of the plants.

One or more experiments were run on each crop. Each experiment was replicated in eight randomized blocks, and each plot was 35 feet long with 3 to 8 rows. The strengths and dosages of the DDT sprays and dusts and the number of applications were the maximum believed to be necessary for the seasonal control of the susceptible insect pests of the crops tested. Each crop was protected from insect damage so that the direct effect of DDT, exclusive of the influence of insect control, could be determined. Where DDT was ineffective against insect infestation, rotenone was applied to the entire experiment; where DDT was effective, check plots were dusted with one of the recommended insecticides known to be relatively harmless to the plants.

DDT caused no injury to Bountiful snap bean, Detroit Dark Red beet, Golden Acre cabbage, Hale's Best, cantaloup, Abbott and Cobb cucumber, Ebenezer onion, Alaska and Thomas Laxton peas, Hubbard winter squash, Katahdin and Schago potatoes, and Purple Top White Globe turnips. DDT caused temporary foliage injury to Rutgers and Marglobe tomatoes, Irish Cobbler potato, Stringless Green Pod snap bean, and Fordhook lima bean, but did not affect the yields of these crops. DDT stunted the growth of

(*Turn to page* 113)



A WHOLE FARM THRIVES ON NOURISHMENT

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This means an enormous drain on the rich plant-food elements within a farmer's soil. For these soil ingredients provide the basic starting point for the nourishment of plants, animals . . . even man.

Many of the most effective soil-replenishing fertilizers contain POTASH . . . often Sunshine State Potash, a product of New Mexico. Such fertilizer is *more* than a mere soil nutrient. It strengthens the crops . . . effectively helping them to resist disease and drought.

SUNSHINE STATE POTASH A PRODUCT OF NEW MEXICO

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HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 48/52% K_2O
MANURE SALTS 20% K_2O MIN.

UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York 20, N. Y.

INDUSTRY NEWS

CSC Names Marshall

Clyde T. Marshall, Providence, Rhode Island, has been named general manager of Commercial Solvents Corporation's newly reorganized Agricultural Chemicals Division, it has been announced by H. J. Henry, vice-president in charge of Product Divisions. Mr. Marshall's headquarters will be at the company's main offices, 17 East 42nd Street, New York City.

CLYDE T. MARSHALL

In announcing the appointment, Mr. Henry said that the CSC reorganization plan calls for an Agricultural Chemicals Division which will concentrate exclusively on marketing CSC nitrogen products and insecticides. He added that plans for a new division devoted entirely to CSC animal nutrition products would be announced later this month.

Mr. Marshall has been vice-president and marketing manager of Monowatt, Inc., an affiliate of the General Electric Company.

He attended Cornell College, Mt. Vernon, Iowa, joined General Electric in 1928 and has been associated with that company and its affiliates until his appointment to Commercial Solvents.

As General Manager of CSC's Agricultural Chemicals Division, Mr. Marshall will supervise the marketing of the company's "Dilan," benzene hexachloride and ethyl formate insecticides. He will be in charge of all CSC nitrogen sales, as well.

One of Mr. Marshall's first assignments, Mr. Henry said, will be to pave the way for marketing the greatly increased CSC agricultural chemicals production resulting from the firm's 20-million-dollar facilities expansion program at its plants in Terre Haute, Indiana, and Sterlington, Louisiana. Full scale production from these new facilities is not expected until 1953.

■

Cyanamid's President Dies; Company Names K. C. Towe

Richard C. Gaugler, 59, president of American Cyanamid Co., died January 11 at the New Rochelle (N.Y.) hospital. Mr. Gaugler had been with Cyanamid since 1917, and was named treasurer in 1929. Ten years later, he became vice-president in charge of finance, and in 1947, executive vice-president. He became president only a year ago.

Mr. Gaugler was a director of several companies associated with American Cyanamid. These include Jefferson Chemical Co., Inc., Southern Minerals Corp., Southern Petroleum Corp. and Southern Pipe Line Corp. He was also a director of several Cyanamid subsidiaries, including North American Cyanamid, Ltd., Chemical Construction Corp., Davis & Geck, Inc., and the Berbice Co., Ltd.

He was a native of Pittsburgh, Pa. and a graduate of Duquesne, University.

Kenneth C. Towe was elected president of American Cyanamid Company at a meeting of the board of directors on Tuesday, January 22nd. to succeed the late Mr. Gaugler.

Mr. Towe has been a director of the company since 1939.

The new president has been associated with the Cyanamid organization since April 26th, 1926 when he joined the company as a member of the Accounting Department. He progressed through the positions of assistant treasurer and comptroller and was appointed treasurer in 1939. In 1945, Mr. Towe was promoted to vice-president in charge of finance, a position which he occupied until his election as president.

KENNETH C. TOWE
New Cyanamid President

Mr. Towe is a director of several companies associated with American Cyanamid Company. These include Porocel Corporation, jointly owned with Attapulgus Clay Company; Southern Minerals Corporation; Southern Pipe Line Corporation; and Southern Petroleum Corporation, all jointly owned with the Pittsburgh Plate Glass Company. He is also director of Cyanamid's principal subsidiaries, North American Cyanamid Limited, Chemical Construction Corporation, and Cyanamid Inter-American Corporation.

He is a native of Elizabeth City, North Carolina, and after finishing the secondary schools, was educated at Trinity College, (now Duke University), Durham, N. C. During World War I, he served as a captain in the Quartermaster Corps of the United States Army.

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ALDRIN 20% Dust Base

DINITROS Pre-emergence Herbicides

Named Hudson Sls. Mgr.

Julian B. Mendelsohn has been named sales manager of the Multi-Wall Sack Department of the Hudson Pulp & Paper Corp., the company

JULIAN B. MENDELSOHN

has announced. Prior to his new appointment, Mr. Mendelsohn was division manager of the Company's Metropolitan New York Division.

T. H. Mittendorf, Hudson's vice-president in charge of sales, points out that Hudson's multi-wall sack production facilities have been sharply stepped up by the addition of more woodlands, new pulp-producing facilities, a new paper machine and new converting facilities. All additions were made to Hudson's mill in Palatka, Florida, where the company first started multi-wall production in 1948. (Photo on Page 95)

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Hercules Ups Langmeier

Arthur Langmeier has been named assistant general manager of the Naval Stores Department of Hercules Powder Company, Wilmington. Formerly, he was director of operations of that department.

A. H. Reu, manager of Georgia operations of the Naval Stores Department, becomes director of operations for the department in Wilmington, replacing Mr. Langmeier.

George E. Bosserdet, general superintendent of the naval stores plant at Klamath Falls, Oregon, will succeed Mr. Reu as manager of Georgia operations.

A native of St. Louis, Mo., Mr. Langmeier joined Hercules Powder Company upon graduating from the University of Missouri in 1918. He engaged in chemical and engineering laboratory work at plants in Kenvil, N. J., and Brunswick, Ga. for six years, then moved to Wilmington as assistant to the technical director of the company.

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Keyes Elected To Academy

Dr. Donald B. Keyes has been elected a Fellow of the New York Academy of Sciences. He is an adviser of the National Association of Manufacturers Research Committee, a special consultant to Heyden Chemical Corporation and a director of Heyden.

Dr. Keyes was Professor of Chemical Engineering and Head of the Chemical Engineering Division of the University of Illinois from 1926 to 1945—on leave for the last four years of this period for service in Washington.

MEETINGS

Seventh Annual Midwestern Shade Tree Conference. LaSalle Hotel. Chicago. Feb. 13-15.

Third Alabama Annual Short Course. Auburn. Ala.. Feb. 26. 27.

Southwestern Branch. A. A. E. E.. Plaza Hotel. San Antonio. Texas. February 28 & 29.

South Dakota Weed Conference. Huron. S. D.. March 20 & 21

N. Central State Branch. AAEE. St. Paul Hotel. St. Paul. Minn.. March 27 & 28.

National Agricultural Chemicals Association. Spring Meeting. San Francisco. Calif.. Fairmont Hotel. April 6-9.

National Fertilizer Association. Greenbrier Hotel. White Sulphur Springs. W. Va.. June 16-18.

Pacific Branch. A.A.E.E.. Mar Monte Hotel. Santa Barbara. California. June 17-19.

American Plant Food Council. Homestead Hotel. Hot Springs. Va.. June 19-22.

Soil Improvement Committee. Pacific Northwest Plant Food Association. Pocatello. Idaho. July 9. 10 & 11.

American Phytopathological Society. Cornell University. Ithaca. N. Y.. September 9-12.

Joint meeting. North Central Weed Control Conference and Western Canadian Weed Conference. Royal Alexandra Hotel. Winnipeg. Canada. December 8. 1952.

Hauseman Joins Davison

Appointment of David N. Hauseman, a retired brigadier general of the U. S. Army, as a marketing executive of The Davison Chemical

DAVID N. HAUSEMAN

Corporation has been announced by R. L. Hockley, executive vice-president. General Hauseman resigned as president of Houdry Process Corp. of Philadelphia to join Davison's executive force.

Born in Pottstown, Pa., General Hauseman received a B.S. degree in economics from the University of Pennsylvania in 1918, a B.S. in mechanical engineering from Massachusetts Institute of Technology in 1928 and a master's degree in business administration from Harvard University in 1935.

Entering the army in the first World War, General Hauseman had had 29 years of service when he applied for and was granted retirement in 1946.

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Weed Meeting in December

A joint meeting of the North Central Weed Control Conference and the Western Canadian Weed Conference is scheduled to be held the week of December 8th, 1952, at the Royal Alexandra Hotel, Winnipeg, Man., Canada. More definite program plans will be announced later, according to H. E. Wood, director of the publications branch of the Manitoba Department of Agriculture, Winnipeg. The meeting will be the 9th for the NCWCC and the 6th for the Canadian group.

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To Head Goodrich Chem.

John R. Hoover has been elected president of B. F. Goodrich Chemical Company, Cleveland, Ohio, the company has announced. Mr. Hoover succeeds William S. Richardson, whose increased responsibilities as vice-president of the parent company, B. F. Goodrich Co., will include the chemical firm. He will continue to make his headquarters in Cleveland, at the chemical concern's main offices.

Mr. Hoover, formerly sales vice-president of B. F. Goodrich Chemical Company, joined the B. F. Goodrich organization in 1925 as a chemist in the company's works laboratories in Akron. His sales career began in 1932 when he was made assistant sales manager of the company's rubber lined equipment department and the sale of other products for the chemical industry.

The company has announced that James C. Richards, Jr., has been elected vice-president in charge of sales to take the office vacated by Mr. Hoover.

Allyn I. Brandt, formerly general sales manager, has been named general merchandising manager of the company.

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Tex. Gulf Personnel Shifts

P. George Maercky, vice-president of Texas Gulf Sulphur Co. has recently retired because of ill health. Richard T. Fleming has been made vice-president and general counsel of the company, and E. F. Vanderstucken Jr., secretary.

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Langhorst, Cyanamid, Dies

Harry Langhorst, manager of the Insecticide Department of American Cyanamid Company's Agricultural Chemicals Division, died January 19th at New Rochelle, New York.

He had been with the firm in the insecticide field for 23 years, joining Cyanamid in 1929 as an insecticide salesman. He was promoted to assistant manager of the Insecticide Department in the early thirties, and was named manager in 1947.

Mr. Langhorst was a member of the OPS Industry Advisory Committee on Agricultural Pesticides and of the Legislative and Membership Committees of the N.A.C.A.

He was one of the most widely known persons in the insecticide field and was responsible for the Company's sales of "Thiophos" parathion.

Sulfur Situation Discussed by Industry Group

FOREMOST among industry problems considered by the U. S. Department of Agriculture's Fertilizer Industry Advisory Committee in its January 18 meeting in Washington, D. C., was the shortage of sulfuric acid for production of phosphate fertilizers. Industry spokesmen also questioned whether everything possible is being done to increase sulfur supplies and urged that all feasible steps be taken to get the critically short commodity from Mexico, Central America or other possible supply sources.

NPA representatives stated that no improvement in the sulfur situation appears probable in the next few years, although the agency would do everything possible to enable the fertilizer industry to get its share of the scarce material.

Harold K. Hill, deputy administrator, PMA, USDA, outlined the scope of the 1952 production goals program, pointing out that the size of the job in 1952 will make the need for fertilizer more important than in 1951. W. A. Minor, assistant to the Secretary of Agriculture, pointed out that fertilizer use in the U. S. has doubled in the past 8 years and that similar increases lies ahead. He urged the industry to keep pace with this expansion.

Prospective supplies of basic fertilizers for 1952, as estimated by the Department, were given to the committee as follows: nitrogen, 1,375,000 tons, an increase of 7 percent over 1951; potash, 1,515,000 tons, up 5 percent from last year; and phosphates, 2,100,000 tons, off 6 percent from 1951.

Other Department spokesmen at the meeting included Jonathan Garst, Office of the Secretary; T. L. Ayers, Agricultural Conservation Programs Branch, PMA; W. R. Allstetter, Office of Materials and Facilities, PMA; and R. Q. Parks, Bureau of Plant Industry, Soils and Agricultural Engineering, ARA. Speakers from NPA were G. M. Hebbard and P. H. Groggins, both of the Chemical Division. L. B. Taylor, director, Office of Materials and Facilities, PMA, was chairman of the meeting, and L. G. Porter, chief, Fertilizer Staff, CMF, vice chairman.

The Fertilizer Industry Advisory Committee includes 28 industry members. Those attending the January 18 meeting were.

Horace M. Albright, U. S. Potash Co., New York, N. Y.; Richard E. Bennett, Farm Fertilizers, Inc., Omaha, Neb.; Bedford Bird, National Farmers Union, Denver, Colo.; James D. Dawson, Jr., Fidelity Chemical Corp., Houston, Texas; J. F. Doetsch, Chilean Nitrate Sales Corp., New York, N. Y.; Ralph B. Douglass, Smith-Douglass Co., Inc., Norfolk, Va.; A. M. Eno, G.L.F. Soil Building Service, Ithaca, N. Y.; B. B. Fall, The Rogers & Hubbard Co., Portland, Conn.; M. G. Field, Meridan Fertilizer Factory, Hattiesburg, Miss.; E. A. Geoghegan, The Southern Cotton Oil Co., New Orleans, La.; Charles E. Heinrichs, Virginia-Carolina Chemical Corp., Richmond, Va.; Cecil A. Johnson, Agricultural Products Co., Webster City, Iowa.

B. H. Jones, Sunland Industries, Inc., Fresno, Calif.; M. H. Lockwood, International Minerals & Chemical Corp., Chicago, Ill.; John A. Miller, Price Chemical Co., Louisville, Ky.; Ray E. Neidig, Balfour-Guthrie & Co., Ltd., San Francisco, Calif.; J. Elam Nunnally, The Cotton Producers Assoc., Atlanta, Ga.; John R. Riley, Jr., Spencer Chemical Co., Kansas City, Mo.; Walter S. Rupp, (Paul J. Prosser, substitute) Baugh & Sons Co., Baltimore, Md.; John E. Sanford, Armour Fertilizer Works, Atlanta, Ga.; John W. Sims, The Farm Bureau Coop. Assn., Inc., Columbus, Ohio; Fred T. Techter, Allied Chemical & Dye Corp., New York, N. Y.; James E. Totman, (Ralph E. Fraser, substitute) Summers Fertilizer Co., Baltimore, Md.; W. N. Watmough, Jr., Davison Chemical Co., Baltimore, Md.; Fred J. Woods, The Gulf Fertilizer Co., Tampa, Fla.

Members of the Committee unable to attend the meeting were:

George W. Gage, Anderson Fertilizer Co., Inc., Anderson, S. C.; C. D. Shallenberger, Shreveport Fertilizer Works, Shreveport, La.; Mac C. Taylor, Oregon-Washington Fertilizer Co., Seattle, Wash.; J. Ross Hanahan, Planters Fertilizer & Phosphate Co., Charleston, S. C.

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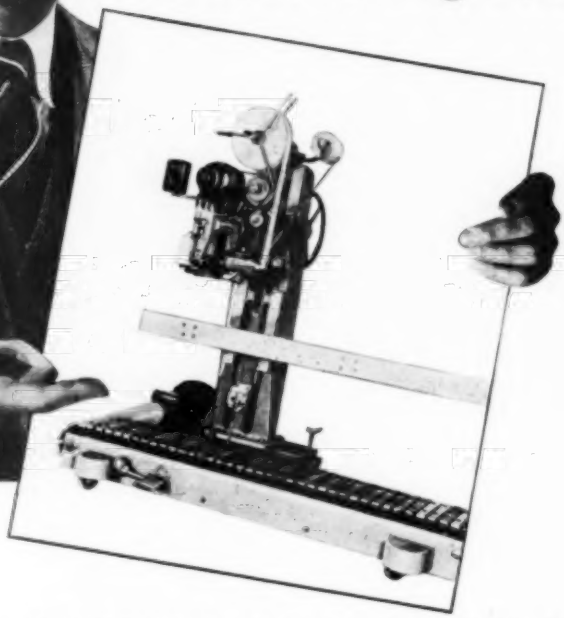

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Bogaard to MGK Co.

McLaughlin Gormley King Co., Minneapolis, Minnesota, manufacturers of pyrethrum and allethrin concentrates, have announced the appointment of Thomas G. Bogaard as firm representative in the South Central states. Mr. Bogaard will make his headquarters in Kansas City, Missouri.

Before joining McLaughlin Gormley King Co., Mr. Bogaard was associated with Monsanto Chemical Company in the Phosphate Division.

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Plan New Hercules Plant

Hercules Powder Co., Wilmington, Del. has announced that it will erect an $8 million plant to produce various chemicals by hydrocarbon oxidation. The company will make phenol, para-cresol and acetone, according to the announcement.

Hercules is well known to the pesticide trade as the manufacturers of toxaphene, chlorinated hydrocarbon insecticide. The company recently announced plans for construction of a new $2½ million plant for the manufacture of toxaphene at Las Vegas, Nevada. The new facilities are expected to increase the present output of toxaphene by 25%.

•

Fales Retires from A.A.C.

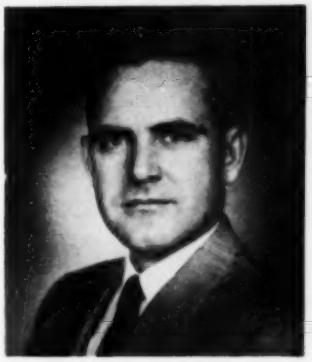
American Agricultural Chemical Co., New York, has announced the retirement of John Fales, manager of the company's wholesale and export department. He has been with the firm for 36 years. His successor is George A. Swanson, formerly assistant manager, who has been with A.A.C. for 28 years.

•

Dilworth Joins Sprajet

Accessories Manufacturing Company, manufacturers of Sprajet spray equipment, has announced the appointment of Hal C. Dilworth as their Southern sales manager. Mr. Dilworth, formerly educational specialist with the National Cotton Council of America, will continue to make Memphis his headquarters, with offices at 206 Eighty-one Madison building.

He joined the Sprajet organization as of January 1, after having been with the Cotton Council since March, 1946. In charge of the Coun-



HAL C. DILWORTH

cil's cotton insect control program, he co-ordinated control activities with the United States Department of Agriculture, state experimental stations, agricultural extension services, farm veteran organizations, and other agricultural groups. He was instrumental in the start of the Annual Beltwide Cotton Insect Control Conferences and initiated the publication of annual bulletins summarizing the proceedings of these meetings. He also helped found the council's bulletin of state recommendations for cotton pest control.

Mr. Dilworth is an agriculture graduate of Mississippi State College, is a member of Alpha Tau Alpha, National Agricultural Educational Fraternity and was a lieutenant colonel during World War II. He lives with his wife and son in Memphis.

•

Appoints Representative

Emulsol Corporation, Chicago, manufacturers of surface active agents, has announced the appointment of Industrial Chemical Co., Issaquah, Washington, as technical sales representative of the agricultural, industrial, food and other industries in the states of Washington and Oregon. The newly-appointed company representative is John Ardussi.

Winter Tour on in South

The sixth annual winter grazing tour, sponsored by the Pasture Committee of the National Fertilizer Association was scheduled to begin January 29 at Tifton, Ga. and continue through February 1, when the group was to break up at Ona, Florida.

Although the itinerary is limited to Georgia and Florida, many persons from other locations were expected to be present on the trip. The pasture Committee is composed of Borden S. Chronister, Barrett Division, Allied Chemical & Dye Corp., chairman; J. Fielding Reed, American Potash Institute; J. A. Naftel, Pacific Coast Borax Co.; John Wood, Texas Gulf Sulphur Co.; and Karl Baur.

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Coffin to Durham Co.

Durham Chemical Co., Los Angeles, Calif, has announced appointment of O. T. Coffin as entomologist and field representative.

Mr. Coffin is a graduate of the Univ. of California, and has had many years of experience in the fields of entomology, insecticides and fertilizers. He was formerly with the State department of agriculture, and lately with Swift & Company, Los Angeles. He will act as adviser to growers in his area.

•

Greene to Monsanto Post

The appointment of Edmund Greene of Everett, Mass., to the newly-created position of sales promotion manager of Monsanto Chemical Company's Organic Chemicals Division, has been announced by Robinson Ord, division general manager of sales.

Mr. Greene joined Monsanto in June, 1947, in the Industrial and Public Relations Department. He is a graduate of Harvard University with an A. B. degree in chemistry, worked for three years on newspapers in Boston. He was employed for a year by Smith, Kline & French Laboratories, pharmaceutical manufacturers, and for eight years by Rohm & Haas of Philadelphia before joining Monsanto.

Insect Nomenclature Bothers This Writer

by
Joseph Dolson
Advertising Manager, Hercules Powder Co.
Wilmington, Delaware

In the *Hercules Salesman*.

WE have been asked to discourse more fully on some of the insect pests against which toxaphene has been making such commendable progress. It seems that many of our technically-trained men, long accustomed to the tongue-twisting nomenclature of chemistry, are not equally fluent in the language of entomology.

Some of these insect pests are identified by the crop or animal they attack. The boll weevil, of course, attacks cotton bolls. We have an alfalfa weevil, a clover weevil, a strawberry root weevil, and so on. (There is an onion thrip, and it attacks cotton, but don't let that distract you.) In this class, too, are the corn borer, sheep tick, cotton aphid, lamb chop, and carrot shredder.

Often the scientists have been too specific when naming insects. Almost anyone could dub something a slender pigeon louse as opposed to a small pigeon louse, or even a fat pigeon louse. The problem is whether it is the pigeon that is slender, small, or fat, or is it the louse? Likewise, what is a flea beetle? A flea, or a beetle?

Who's Confused?

THERE is also a confused carpet beetle, but he is not at all bewildered. "Confused" means joined together, in this bug language. Among human beings, when someone is confused, persons say he has gone all to pieces. Here is one simplified way of distinguishing between the two languages, or between humans and carpet beetles.

Here is another instance where the human and insect terminologies collide. Entomologists speak of a differential grasshopper. This, presumably is one which does his traveling by automobile. It is probably related to the transmission grasshopper, and the sealed-beam grasshopper.

The bug men sometimes jump to wrong conclusions. The solitary oak leaf miner is frequently found with others of his class. He isn't solitary and he isn't a miner either, for that matter. The rapid plant bug is not much quicker than any other bug. The tarnished plant bug has not lost its virtue, nor does it lay eggs in old silver. We have run across the red spider mite, but so far nobody has found the more bashful species, known as the red spider mite not.

What's in a Name?

THE fleahopper is not a pest that hops over fleas, but a grasshopper is one that hops over grass, isn't it? The plum curculio is not

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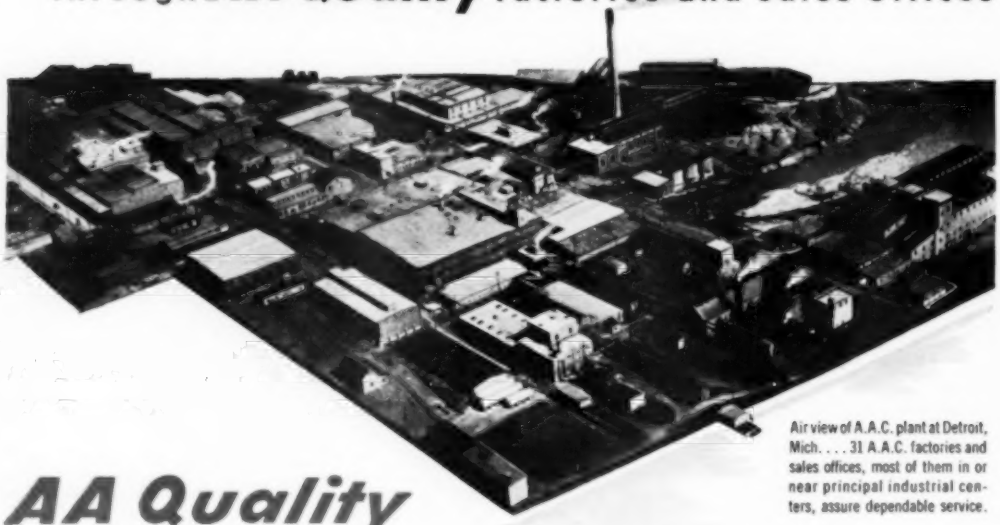

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DDT Exports Planned

A 25,000,000-pound DDT export licensing program for the first six months of the "insecticide year," October 1, 1951, through September 30, 1952, was announced January 8, by the Office of International Trade, U. S. Department of Commerce.

Previously, 20,000,000 pounds of DDT were programmed for export licensing in the full year. The new increase was made possible by the successful efforts of DDT producers to maintain high production during the past three months and the outlook for continued high production during 1952, OIT said.

NPA has concurred in this new export program, which is designed to help carry out urgent defense, agricultural, and health requirements for DDT abroad.

In the first quarter of the current insecticide year (fourth quarter, 1951), 10,300,000 pounds of DDT were licensed for these purposes. The balance of the new program, 14,700,000 pounds, will be licensed in January and February, 1952, so that exports can move before domestic demand for DDT reaches its customary peak. These quantities, together with 10,574,000 pounds of DDT licensed in the third quarter of 1951, will bring the quantity of DDT authorized for overseas shipment in the nine-month period beginning July 1, 1951, to a total of 35,574,000 pounds.

Under the new program, OIT will license against country "target figures." The licensing targets take into consideration information on DDT requirements in the importing countries which OIT and the Mutual Security Agency have obtained from both trade and governmental sources.

Since February 1, applications have been considered, in order of receipt, for approval against the total unlicensed balance, without respect to individual country target figures until the full 25,000,000 pounds have been licensed, or until March 1, whichever occurs earlier.

Benzol Ceilings Rise

The right to ask for higher price ceilings to increase the output of benzol and naphthalene from coke oven gas and coal tar has been granted to producers by the Office of Price Stabilization. A new order sets up the procedure by which producers of these two by-products of the coke and coal chemical industry may apply for the higher ceilings. The purpose of the order is said to be to offset the increased cost of recovering greater amounts of the two products.

At present, OPS said, the industry can recover profitably, only about 90% of the benzol found in gas streams from coke oven operations. The order is expected to make it profitable to recover some or all of the remaining 10%.

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J. M. Gibson Dies

J. M. Gibson, for many years in charge of fertilizer manufacturing operations of the Cotton Producers' Association, Atlanta, Ga., died suddenly on January 4.

Heads Gen. Chem. Div.

MARK N. BIDDISON

Mark M. Biddison, recently elected president of General Chemical Division of Allied Chemical & Dye Corp., New York. He succeeds H. O. C. Ingraham who retired on January 1.

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OPS Sets Bag Prices

The Office of Price Stabilization on January 15, issued a tailored regulation for the paper shipping sack industry which freezes prices of individual manufacturers at the levels established by the General Ceiling Price Regulation, GCPR, except for minor increases on products made from 40 pound kraft shipping sack paper.

The new Regulation, CPR 115, effective January 19, covers paper shipping sacks produced and sold in the United States and its Territories and possessions. It freezes the manufacturer's price list or formula, or both, as used in pricing during the base period of January 25 to February 24, 1951, subject to the prescribed adjustments.

Ceilings established under the new regulation will be at approximately present price levels.

The new regulation conforms with the requirements of the Capehart Amendment to the Defense Production Act by fixing ceilings not lower than (a) the price prevailing just before issuance of the regulation, or (b) the price prevailing from January 25 to February 24, 1951.

The adjustment allowed for 40 pound kraft shipping sack paper, it is estimated, will not increase prices more than one-half of one percent on the average. Increases which do occur in practically every instance will be absorbed by consuming industries and not passed on to the ultimate consumer.

A manufacturer who starts production after the effective date of the regulation must apply to OPS in Washington, proposing his price lists and formulas. He may not employ them until approved by OPS, which approval is automatic after 15 days if OPS does not act on them in the meantime.

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British Fertilizer Meeting

The British Fertilizer Society will hold its next meeting February 28 in London, the group has announced. Speaker at the meeting will be E. M Crowther who will discuss "American Fertilizer Practices and Problems". The meeting is scheduled to be held at the Geological Society, Piccadilly.

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Ark. Considers 2,4-D Ban

The Arkansas State Plant Board met January 11 in Little Rock to consider changes in regulations affecting sale and use of 2,4-D, but adjourned until an unnamed date in March to consider proposed changes.

More than one hundred complaints have been received from cotton growers who declared that their crops have been injured when airplanes sprayed the herbicide on nearby rice fields. Proposed changes include:

1. Prohibition of the use of airplanes for spraying of 2,4-D in Lincoln, Jefferson and Lonoke Counties of central Arkansas, all heavy cotton-producing counties in the alluvial Arkansas River Valley. Most of the complaints have come from this area.

2. Enactment of a law permitting planes to be used in other counties but not within one mile of a cotton field.

Present regulations permit application of the weed killer by airplane in any county, but require the planes to maintain minimum distance of one-eighth of a mile to two miles, depending on prevailing wind velocity.

Sentiment at the meeting favored elimination of airplane application of the weed killer throughout the state. Several speakers said the existing regulations will prevent damage to cotton farmers if they are enforced, but Chairman Floyd Fulkerson of the Plant Board said the agency does not have the manpower or authority to compel proper operation. Faulty equipment and careless handling of planes during operation was blamed for much of the provable damage, and both Fulkerson and State Representative Ben Bynum of Chicot County warned the group that the 1953 legislature may ban the use of 2,4-D in the state entirely unless cotton damage is reduced this year.

Other speakers pointed out that such a ban would be a serious blow to Arkansas farming, since sump weed, as an example, is becoming a real menace to lespedeza seed production and 2,4-D is the only practical way now known to control it. Also brought out was the fact that mechanization of corn production also depends on this or a similar chemical for weed control.

■

U. S. Potash Ups Porterfield

William B. Porterfield, Jr. has been made assistant sales manager of U. S. Potash Company, New York. He was formerly a sales representative for the company, but will now be headquartered in New York City. Sam E. Hardwick, Richmond, Va., will replace Mr. Porterfield in the field.

■

New Pesticide Warehouse

A new two-story steel-and-concrete building is being erected by the Adkins-Phelps Seed Co. at Little Rock, Ark., to house its wholesale business which includes distribution of pesticide products made by Delta Insecticide & Chemical Co. The latter company's plant is now under construction.

That's right!

A harvest of packaging ideas and finished bags. And Betner is especially pleased with the Betner "Duo-Tite" bag. It's designed particularly for bulk powdered products. Constructed with special liners, the "Duo-Tite" bag assures "no-sift" of particles . . . whether it contains chemicals, insecticides, fertilizers, or any bulk powdered product.

BETNER'S SERVICE IS COMPLETE . . .

Betner can supply the special machinery for closing the "Duo-Tite" bag . . . it heat-seals, double folds and pastes the tops in exactly the same manner as the bottom is constructed.

It's folded, glued and heat-sealed to *positively prevent* sifting. The "Duo-Tite" is available in a variety of sizes (holds 1 to 25 pounds), colors and combinations of materials. Each bag is inner-heat sealed and protected by "Duo-Tite" turnover. And the price will interest you.

• **Whatever the packaging need, there's a Betner bag . . . FILL IT!**

Benj C Betner Co *Devon, Pa.*

***Plants also located in:* Richmond, Virginia; Paris, Texas; Appleton, Wisconsin; Los Angeles, California**

Hudson Pulp & Paper Expands Facilities in Florida

Hudson Pulp & Paper Corp. has announced the opening of a $10,000,000 addition to its mill at Palatka, Florida. (above) The additional facilities will double production of the plant which was originally erected in 1946, helping to swell the U.S. papermaking capacity to 17,600,000 tons. About 85% of this mill's total output goes into kraft paper of the type used in bags for chemicals and fertilizer storage and shipping. The new part was dedicated Dec. 6th.

New, Better Controls

North Carolina Agricultural Experiment Station, Raleigh, N. C., reports that DDT dust or parathion dust give more effective, cheaper and easier control of midges and crane flies on tobacco seedlings in plant beds than do moth flakes which the farmers have been scattering on their beds for fifteen years. Experiments showed that it required 45 minutes to spread 1½ to 2 lbs. of naphthalene per 100 sq. yds. and that kill was about 85 percent. In contrast, a 5 percent DDT dust or a 1 percent parathion dust, took 15 minutes each to apply over 100 sq. yds. with a 95 percent kill for DDT and a 99 percent kill for parathion.

•

Pesticides Defended

Bugs cost 4 billion dollars annually in the damage they do to agricultural crops, Dr. Francis F. Heyroth, assistant director of the Kettering Laboratory, Cincinnati, Ohio, declared in a recent talk before the Engineering Society of Cincinnati. Insecticides increase the food supply by destroying these insects, and further, add greatly to the good health of the public through control of diseases such as typhus and malaria.

Dr. Heyroth pointed out that by their very nature, insecticides must be toxic; "but it is generally agreed that the hazard associated with the use of insecticides is far outweighed by their public health value."

Insecticides, Herbicides

MORE COVERAGE

greater wetting power

Formulators of insecticides and herbicides produce better products—and, therefore, better sales—when they include an active emulsifier in their formulations.

Monsanto emulsifiers perform two important functions: (1) They make it possible to secure a uniform emulsion, by transforming an organic solvent or oil concentrate into an "emulsifiable concentrate." This can be diluted with as much as 10 to 50 parts or more of water . . . (2) By adding wetting and dispersing properties, they assure greater over-all covering power and, therefore, greater effectiveness.

For full information on emulsifiers and dispersants for insecticides, herbicides and fungicides, write MONSANTO CHEMICAL COMPANY, Organic Division, 1700 South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Canada Limited, Montreal.

EMULSIFIERS MONSANTO CHEMICALS—PLASTICS DISPERSANTS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Brisbois to Peerless

Announcement is made by Peerless Pump Division, Food Machinery and Chemical Corporation, of the appointment of Roy F. Brisbois as process pump specialist. Mr. Brisbois will devote his time to pump application problems in refineries, chemical process and industrial plants, coordinating his efforts with the Peerless' field engineers and distributors. He is a graduate of the University of Southern California.

•

Ark. Group Elects

New members of the board of directors of the Arkansas Farmers Plant Food Company, elected at a recent N. Little Rock meeting of stockholders, are: Elmer Miller, Little Rock; Raymond Frey, Paragould; Joe C. Hardin, Grady; Ralph Hudson, Harrison; Walter D. May, Jr., Marion; Joe Reed, Springdale; Dick Barnett, Altheimer; Nolan Crawford, Arkadelphia; R. E. Short, Brinkley; Fred P. Blanks, Parkdale; Harold Ohlendorff, Osceola; and Harry Goforth, Fayetteville. The group contains four members each of the boards of directors of the Arkansas Farm Bureau Federation, Arkansas Farmers Association and other farm groups, consolidated. The company's two-year-old North Little Rock fertilizer plant, built with $418,000 in capital raised by members of the Farm Bureau Federation, has effected profits of $43,635 in its first year of operation and approximately $237,000 in its second year. The last named figure was a profit of 57 per cent on the $113,000 in sales commissions and original investment, after paying $25,250 in income taxes.

•

Hooker Plans Expansion

Plans for a 5 million dollar plant expansion program for Hooker Electrochemical Company name been announced by R. L. Murray, president. Mr. Murray stated that the company will begin immediately a large construction program for its Tacoma, Washington plant to increase its chlorine and caustic soda output for the pulp and paper.

New CSC Plants in La.

Construction is under way on new ammonia and methanol production units being built by Commercial Solvents Corporation at Sterlington, La. and Monroe, La. The CSC expansion program, expected to cost approximately $20 million, will double the plant's present production of ammonia and methanol. The additional units are to be in operation in a year.

Woods Corn Prod. Director

J. Albert Woods, president of Commercial Solvents Corporation, New York, has been made a director of the Corn Products Refining Corp., the company has announced. Mr. Woods is also a director of C.S.C.; Chemical Bank & Trust Co.; Wilson & Toomer Fertilizer Co.; Southern States Bag Co. and Thermatomic Carbon Co.

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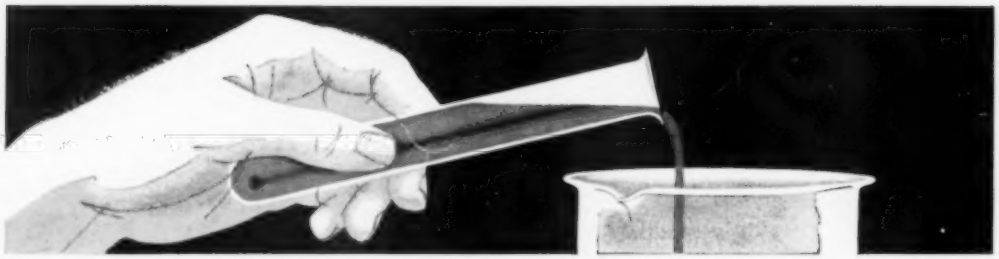

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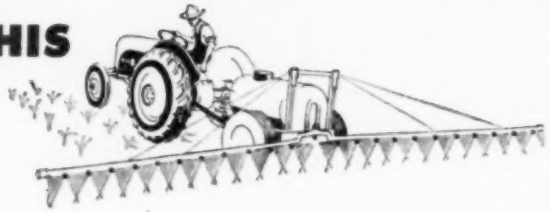

DOW agricultural chemicals
are top quality!

QUALITY is the biggest factor in selecting chemicals for farm use—and QUALITY is the word for Dow Agricultural Chemicals! They're the *best* that Dow research and nearly 50 years' manufacturing experience can produce.

There is no guesswork in the choice and use of these *proved* aids to better farming. Many years are spent in developing recommendations that you can depend upon. The instructions on the label of every Dow product are the result of extensive laboratory testing *plus* field testing in cooperation with federal and state agencies and private growers.

We invite you to look first to Dow's complete line of QUALITY agricultural chemicals for supplying your needs. Our trained sales and technical men are available to help you with your problems. Just call the nearest Dow sales office or write direct to Midland.

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USE DEPENDABLE DOW AGRICULTURAL CHEMICAL PRODUCTS

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CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE

always found on plums, and the pear psylla is not on pears. Seems psylla but that's the way it is. Some of this illogical terminology is undoubtedly due to the fact that you don't have to be a scientist to discover a new species of insect. Take thrips, for instance. Scientists found the onion thrip, pear thrip, etc. but it was a railroad man who found the round thrip, first class.

There is a character called Say stink bug. Well, say it. Then the Say blister beetle. Say it too. These are the finds of an entomologist named Say, Say Say.

Some insects, when christened, were in varying emotional or physical states (remember the confused carpet beetle?). There is also a depressed flour beetle, a devastating grasshopper a bald-faced hornet, a drug store beetle (not cowboy), and something from Broadway called a twice-stabbed lady beetle. You can easily see the shape some of these poor insects were found in.

There are many more wonders of the insect world, and of its fascinating language, but this type of education is best taken in small doses.

•

Spanish Meeting in May

The program for the VI International Congress of Comparative Pathology scheduled to be held at Madrid, Spain, May 4-11, includes a session on contact insecticides on which a number of American entomologists and pathologists are to appear.

Among these are Dr. E. R. deOng, Albany, California, "The Comparative Toxicology of the Contact Insecticides in Common Use," Dr. Paul Mueller, Geigy Co., Basle, Switzerland, "Chemistry of Contact Insecticides;" Dr. E. F. Knipling, in charge of insects affecting man and animals, U. S. Dept. of Agriculture, Washington, D. C., who will speak on recent developments in applied entomology in the U. S.; and Dr. S. W. Simmons, chief, Technical Development Service, U. S. Public Health Service, Savannah, who will report on "Studies of Organic Phosphorus Insecticide Poisoning."

Chemurgs Study Chemicals

Chemicals in food were to be among the subjects discussed at the 17th annual Chemurgic Conference to be held at the Hotel Statler, St. Louis, March 11 and 12, according to advance notices.

•

S. D. Weed Meet. in March

The 1952 State Weed Conference will be held at Huron, South Dakota, March 20 & 21, according to Charles J. Gilbert, state Weed Supervisor. This year's session, to be held in Huron's new auditorium, will provide space for exhibits, in both the chemical and equipment lines, Mr. Gilbert says. An attendance of between 3,000 and 4,000 persons is expected. Last year's registration was considerably reduced because of a heavy snowstorm.

•

Iowa Firm Changes Name

Change of its name to "Spra-White" Chemical Co., Inc. has been

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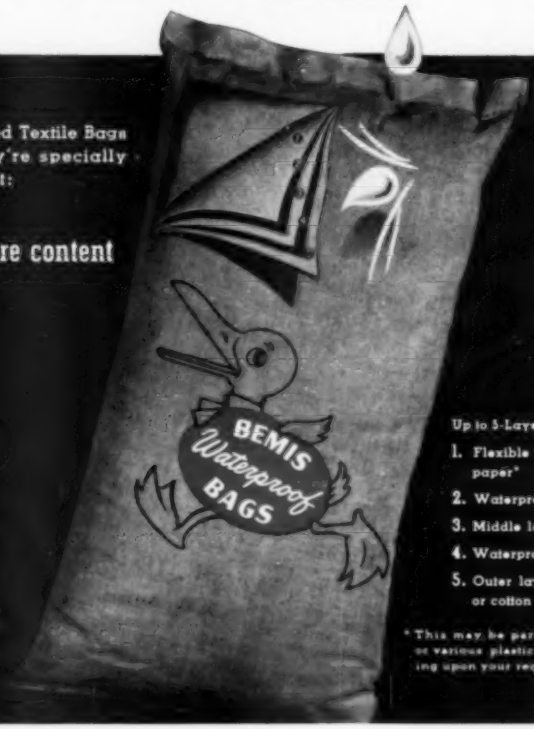
Waterproof Bags

...BUT...THIS KIND OF PROTECTION IS ONLY ONE OF THEIR FUNCTIONS

Bemis Waterproof Laminated Textile Bags are extra strong, and they're specially constructed to guard against:

- Change in moisture content
- Sifting
- Escape of undesirable odors
- Loss from snagging and tearing



Up to 5-Layer Construction:

1. Flexible creped kraft paper*
2. Waterproof adhesive
3. Middle layer of paper
4. Waterproof adhesive
5. Outer layer of burlap or cotton

* This may be parchment paper, or various plastic films, depending upon your requirements.

If you have a "hard-to-pack" product or one that must stand the rough handling of L. c. l., truck, or export shipment, it will pay you to investigate the advantages of Bemis Waterproof Bags.

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"America's No. 1 Bag Maker"

MAYBE YOU NEED THESE, TOO

If you don't require the exceptional protection of Bemis Waterproof Bags, Bemis Multiwall, Cotton or Burlap Bags are your best bet.

WHATEVER KIND OF BAG YOU NEED, WE MAKE IT!

announced by DV Laboratories, Inc., Cedar Rapids, Iowa, manufacturers of agricultural chemicals and spray equipment since 1946. William L. Hicks remains as president of the company and no changes in personnel or policies of the company are contemplated, Mr. Hicks indicated.

•

U. S. Gets 77% of Sulfur

The United States is to receive 77% of the crude sulfur expected to be available in the free world during the first half of 1952, the International Raw Materials Conference decided in its meeting of January 24 in Washington. Canada will share in the U. S. allocation, but no breakdown was revealed.

A continuing shortage of all kinds of sulfur during 1952 was forseen by the conference which estimated production for the year at 5,825,100 long tons which is 1½ million tons short of the demand.

Great Britain's allocation of sulfur the first six months of 1952 will be 194,900 tons, which rates it as second in volume. Italy, France, Australia and Western Germany followed. The smallest amount, 38,500 tons, went to Western Germany.

The sulfur allocations were recommended by the conference's sulfur committee, made up of these sixteen countries: Australia, Belgium, Brazil, Canada, France, Western Germany, India, Italy, Mexico, New Zealand, Norway, Sweden, Switzerland, South Africa, The United Kingdom and the United States.

•

Freeport Names Wilson

Forbes K. Wilson has been appointed manager of mineral exploration for Freeport Sulphur Company, the firm has announced.

A graduate of Yale in mining engineering, Mr. Wilson was associated with Braden Copper Company and later managed several gold mines in Colombia before joining the Freeport organization in 1942.

•

Offers Parathion Poster

Monsanto Chemical Co., St. Louis, is currently distributing a wall poster giving recommended instructions for handling parathion. Protective equipment which should be worn while working with parathion includes goggles, mask, apron, gloves and boots.

•

NAC Plans Big April Meet.

Although no specific announcement has been made by the National Agricultural Chemicals Association in regard to the program of its annual spring meeting in San Francisco, Lea S. Hitchner, executive secretary and treasurer of the Association has indicated that outstanding speakers are being contacted to appear. The meeting, to be held at the Fairmont Hotel April 6-9, is expected to feature representatives of the U. S. Department of Agriculture, State and Federal Agencies, the Office of Price Stabilization, and the manufacturing industry.

Indications point to a large representation from the eastern seaboard in the NAC's first west coast meeting.

'51-'52 Fertilizer Outlook Summarized

THE supply outlook on fertilizers for 1951-52 is summarized in a report by the Office of Materials and Facilities, Production and Marketing Administration, U. S. Department of Agriculture, just issued. According to this summary of the latest available figures, the 1951-52 supply of nitrogen and potash will exceed by a small margin the record quantities available for use in 50-51. It is predicted, however, that there will be somewhat less phosphate than was available last year, and it is probable that distribution on an orderly basis will present a problem this season. Sections of the report are summarized below:

Nitrogen: During 1950-51 there was available for use by farmers about 1,285,000 tons of nitrogen (N). The supply for 1951-52 is expected to be slightly higher, perhaps by seven percent, or about 1,375,000 tons, assuming net imports to be slightly above last year's levels. An increase in industrial demand or change in military requirements could upset this narrow improvement.

Phosphates: The 1950-51 supply is better than originally estimated, aggregating about 2,235,000 tons available phosphoric oxide (P_2O_5) basis. Some curtailment is expected in the porduction of superphosphate due to the sulfur and sulfuric acid scarcity. Allowing for such cutbacks and assuming normal export/import relationships the 1951-52 supply is tentatively estimated to be 2,100,000 tons P_2O_5 basis, or about six percent less than the available quantity in 1950-51.

Potash: A record 1,445,000 tons of potash (K_2O) were available for use in 1950-51. Although a substantial expansion program is underway in the Carlsbad area the contribution of these new facilities will not greatly affect the total tonnage available for use in 1951-52. The probable volume of imports is likewise not too certain at this time. For the present a conservative forecast of an increase of about five percent in the potash supply seems warranted, or some 1,515,000 tons K_2O for 1951-52.

Sulfur: During the year 1950-51 supplies of sulfur for agricultural uses such as superphosphates, ammonium sulfate, pesticides and soil amendments were insufficient to meet essential needs. A continuing shortage is anticipated for 1951-52 and ensuing years unless efforts are made to increase supplies and to promote the use of alternate materials or methods.

The total sulfur available from U.S. production in all forms in 1951 is estimated to be approximately 6,125,000 long tons as compared to 6,000,000 long tons in 1950. Production of crude sulfur (brimstone) in 1951 is estimated at approximately 5,225,000 long tons. The total exports of crude and refined sulfur in 1951 (including Canada) were set by quotas at 1,335,000 long tons. Upon completion of the exports for 1951 it is estimated that approximately 3,890,000 long tons of crude sulfur were available for domestic industry.

In estimating future requirements of sulfur for agricultural purposes the quantity needed for sulfuric acid to produce sufficient superphosphates to balance with the expected supply of nitrogen and potash must be taken into account. It is estimated that during the fiscal year 1951-52, 1,808,000 long tons of sulfur will be required for agricultural purposes and that approximately 1,158,000 long tons will be available, which is 650,000 long tons less than agriculture needs.

There are new facilities being installed, and in some cases now operating, to recover sulfur from various sources. The overall demand for sulfur-sulfuric acid has greatly increased during 1951. Methods of conservation of crude sulfur by substitution of other sulfur-bearing materials have been recommended, as well as the use of alternate materials where applicable.

General: The Department's program for the expansion of fixed nitrogen production capacity by 900,000 tons of N by 1955 has been approved by the Defense Production Administration. A number of new synthetic ammonia plants which are expected to produce a substantial tonnage of nitrogen compounds for agriculture are now in various stages of building; others are scheduled for later starts. Every effort is being made to complete the entire nitrogen expansion program at the earliest date possible. At the best but little contribution from these new facilities can be expected before late 1953 or 1954. In the interim, reactivation of the Morgantown plant is expected to provide some addition to the supply.

There are two new potash mining facilities which over the next one or two years will add substantially to the domestic supply. One facility is now in production and will supply some material for use in 1952.

The PMA State Committees in cooperation with the technical subcommittees on fertilizers prepared reports on the estimated consumption and utilization of major plant food elements by crops and groups of crops during the year ending June 30, 1950. These reports have been summarized and included as a part of the 1951-52 preliminary fertilizer situation. It will be noted that 27.9 percent of the nitrogen, 22.6 percent of the P_2O_5, and 25.8 percent of the K_2O or about one-fourth of the major plant food elements used in 1949-50, were applied to corn, while cotton accounted for only nine percent of the total. Small grains and pasture crops were also heavy consumers of phosphate.

Hold Cal. Weed Conference

The fourth annual California Weed Conference was held at San Luis Obispo, California, January 22 through 24. Attendance was over 300 at a very successful meeting.

The following officers were elected: W. A. Harvey, extension weed control specialist, University of California, Davis, president; Marcus Cravens, deputy agricultural commissioner, Santa Barbara County, vice-president; R. N. Raynor, Dow Chemical Co., San Francisco, secretary; and Norman A. Akesson, Division of Agricultural Engineering, University of California, Davis, Treasurer.

Of particular interest on the program was a panel discussion "What's New in Weed Control." Speaking on this panel, M.C. Swingle of E. I. Du Pont de Nemours & Co. gave a discussion of CMU which attracted particular interest. Discussions of brush control with chemicals were also received with special attention, since this topic is of considerable interest in California.

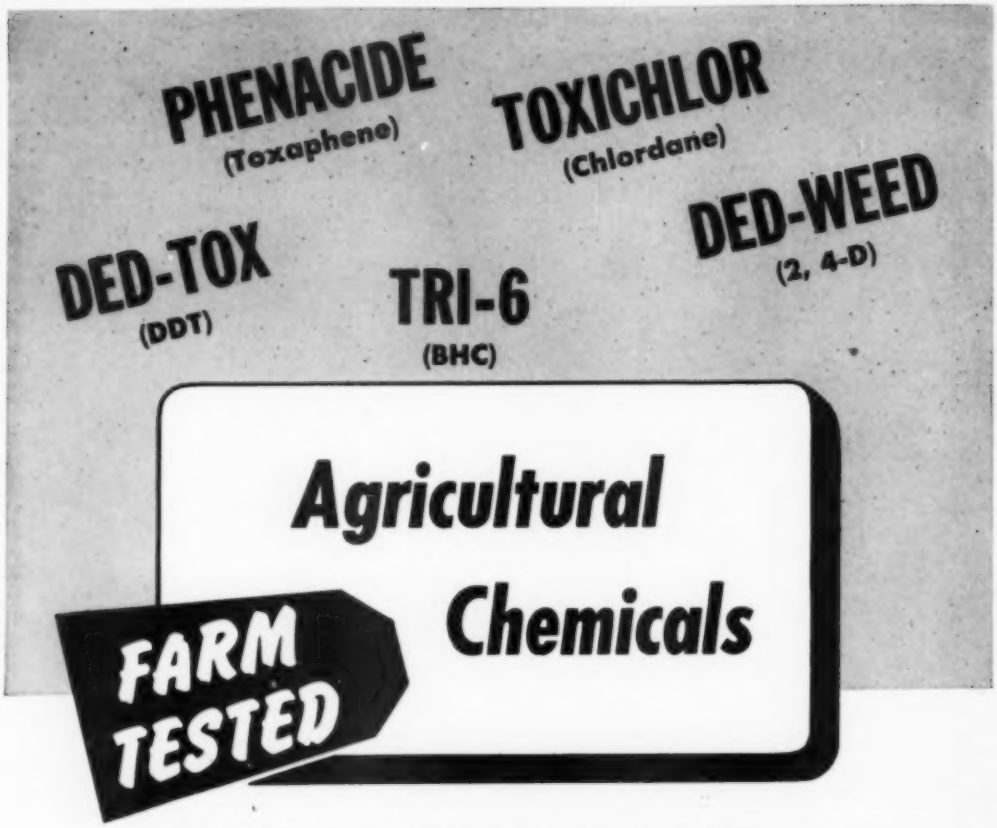
Dr. Oliver A. Leonard reported on nutgrass control. Of the various materials tested, he reported that methyl bromide performed best in actually killing nutgrass. In cotton, oil sprays provide an acceptable method of controlling nutgrass.

•

Form Colo. Ag Chem Assn.

The Colorado Agricultural Chemicals Assn. was organized at a meeting in December, held in Denver. The group consists of manufacturers, formulators and distributors of agricultural chemicals. Its purpose will be to advise and co-operate with state and federal research programs, to assist in co-ordinating industry's work with the operations of regulatory bodies and to promote the development of agriculture in the state of Colorado.

Five directors were elected at the organization meeting: C. A. Dewey, Grand Junction, Colorado, B. T. Snipes, P. A. Ray, W. E. McCauley and F. P. Jasper, all of Denver. The directors in turn elected Mr. Dewey president, Mr. Snipes vice-president and Mr. Ray secretary-treasurer.



As a dealer in pesticides, you may be asked many times by your customers for your recommendations.

When that happens, give Thompson-Hayward farm-tested agricultural chemicals the strong endorsement they have earned.

Times being what they are, the U. S. Department of Agriculture is urging farmers to order at least half their pesticide requirements NOW. Stock up. Be ready for early buying.

Order now for present and future deliveries.

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Harold King, Prentiss Drug President, Dies

Harold R. King, president of Prentiss Drug and Chemical Co., Inc., 110 William Street, New York, died January 28th in the Hernando County Hospital, Brooksville, Florida, after suffering a heart attack.

He was born in Minneapolis, Minnesota, and graduated from the University of Minnesota. After serving overseas in World War I with the Medical Corps, he began his career in the drug, insecticide and chemical business in New York in the early 1920's. Mr. King was prominent in the botanical drug, chemical and insecticide field for the past 34 years, and had been connected with his present firm for the past 20 years.

Surviving are his wife, Effie Adams King; his parents, Mr. and Mrs. George A. N. King of Minneapolis, Minnesota, and two brothers, Herbert and Allen.

Services were held at Westfield, New Jersey, February 2nd, and interment was also at Westfield.

•

Potomac APS Meets in Feb.

The Potomac Branch of the American Phytopathological Society will hold its annual meeting at the Plant-Industry Station auditorium, Beltsville, Md., Feb. 26 & 27, it has been announced. President of the group is Dr. S. P. Doolittle, U.S.D.A., Beltsville.

•

Glendon Products Again

Glendon Pyrophyllite Co., Glendon, N. C., was expecting to resume operations in its new plant early in February. The new installation will have a considerably increased capacity over the former plant which was destroyed by fire last August 1. Warehouse facilities for truckload business is included in the new setup. Raymond mills have been installed for grinding operations.

The old plant was struck by lightning and destroyed on the first day after being taken over by Glendon.

Cotton Council Meeting

The Hotel Roosevelt, New Orleans, was to be the site of the National Cotton Council's fourteenth annual meeting, January 28-29. Senator Allen J. Ellender, Louisiana, was to be the featured speaker on the program, with an address by Harold A. Young, Cotton Council president.

Reports on the 1951 activities of the council were to be made, and recommendations for the coming year were also on the schedule, to be made by chairmen of various committees.

•

S. W. Branch, AAEE Meets

February 28 and 29 are the dates set for the second annual meeting of the Southwestern Branch, American Association of Economic Entomologists to be held at the Plaza hotel, San Antonio, Texas. Program plans had not been announced as this issue went to press. The meeting report will be published later in *Agricultural Chemicals*.

FMC Buys Buffalo Company

Food Machinery & Chemical Corporation, San Jose, Calif., has completed negotiations for the acquisition of the Buffalo-Electro-Chemical Co., Buffalo, N. Y., according to a joint announcement by Paul L. Davies and Charles A. Buerk, presidents of the two companies, respectively. Buffalo Electro is a major producer of hydrogen peroxide.

•

Calabama to Expand

Calabama Chemical Co., manufacturers of DDT, has acquired 30 acres of land near McIntosh, Ala. on which to establish a plant for the manufacture of agricultural chemicals. The property adjoins that of Mathieson Chemical Company's new chlorine-caustic plant.

Calabama was formed in 1947 to make insecticidal chemicals. B.H. Wilcoxon, vice-president of the firm, states that erection of the new facilities reflects the growing need for agricultural chemicals to control pests of livestock and crops.

The new location was selected for its advantageous shipping position, and its proximity to the Mathieson plant which will furnish some of the raw materials needed in manufacturing.

The company will not make finished products, but will serve companies who use basic agricultural chemicals to prepare products for the consumer.

Calabama's present plant is at the Redstone Arsenal near Huntsville, Alabama.

•

Union Bag Ups Calder

Union Bag & Paper Corp. has announced the appointment of Alexander Calder, Jr., as executive vice-president and general manager. Previously, Mr. Calder was vice-president and assistant to the president.

H. S. Daniels, who will soon complete his services as consultant to the OPS in Washington, will take over direction of all company sales as executive vice-president and general sales manager.

James L. Knipe has resigned from Union Bag as vice-president and general sales manager, but will continue his association with the company as a director.

•

Lindane for Farm Use

"Knox Out Farm Insecticide", a new multi-purpose insecticide containing 25 percent lindane, has been formulated for general farm, home and garden use by the Pennsylvania Salt Manufacturing Company. The new product is designed and packaged primarily for the farmer and gardener. It is sold as a powder and applied as a spray. It contains special wetting ingredients which permit quick mixing with water for easy spraying or painting and afford closer application to hair and hide of animals, to walls and other surfaces and to foliage of plants and trees.

Whittington to Mathieson

Joseph S. Whittington has been appointed manager, Agricultural Chemical Sales, Morgantown Division, of the Mathieson Chemical Corporation, the firm has announced. His headquarters will be in the Mathieson Building, Baltimore, Maryland. Mr. Whittington has been engaged in the fertilizer industry for over 30 years. He has been with Mathieson since May, 1949. Prior to that he was manager of sodium sulphate sales for American Potash & Chemical Corporation. He was also, for several years, manager of the Independent Fertilizer Manufacturers Association, Inc.

JOSEPH S. WHITTINGTON

•

Greater S. Output Seen

An increase of 38% in sulfur production for 1955 was set as a goal by the Defense Production Administration on January 10. The new goal was set for 8,400,000 long tons of sulfur, as compared to 6,080,000 tons produced in the U. S. in 1950.

Nearly half of the planned expansion is already in sight, DPA stated. Existing government and private industry expansion plans will boost U. S. production by 1,080,000 tons at the beginning of 1955, it said, whereas the new expansion goal calls for an additional 1,240,000 tons of U. S. sulfur capacity by 1955.

Attainment of DPA's expansion goal is expected through a reduction in U. S. sulfur exports and an increase in U. S. production by developing new sulfur domes and recovering increased amounts of sulfur from petroleum, natural gas, domestic and imported pyrites and smelter acid.

Called the "backbone" of the chemical industry, sulfur's largest users are fertilizer manufacturers. About 75% of the element goes into the production of sulfuric acid which the fertilizer industry uses in large quantities.

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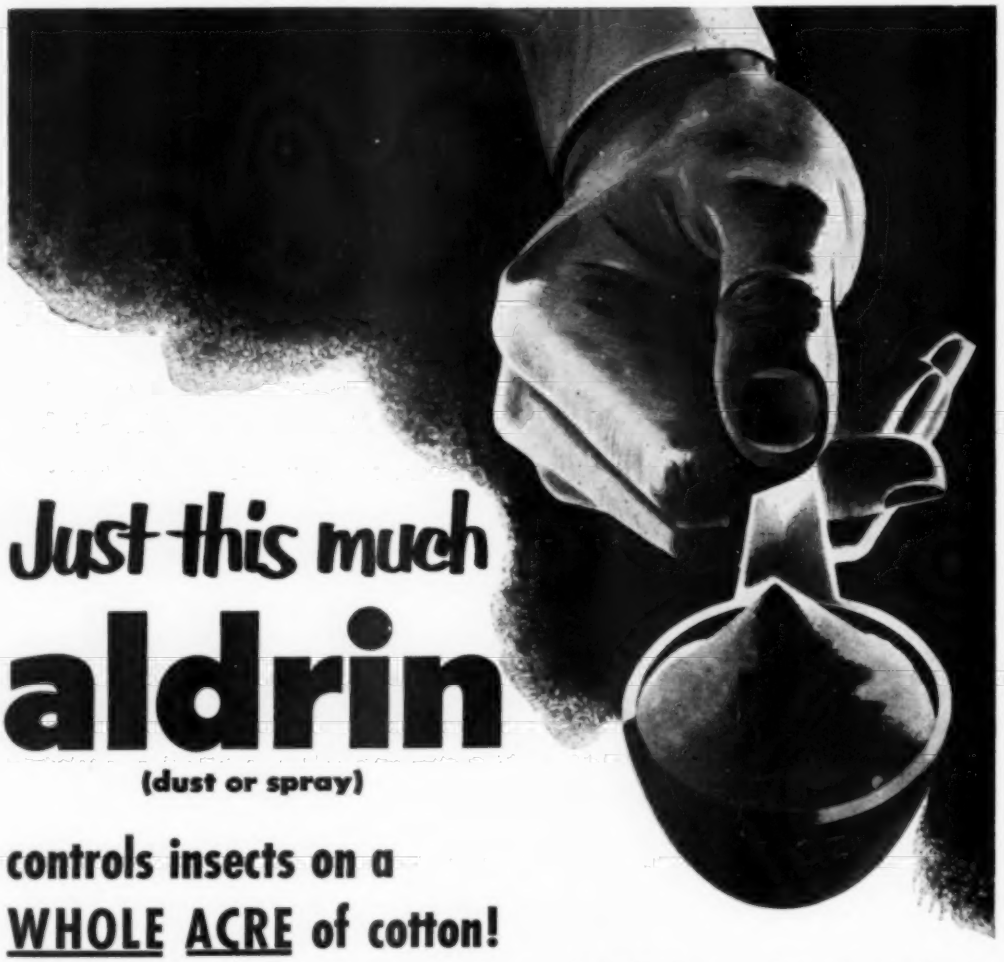
World Fertilizer Picture

According to United Nations press releases just issued, fertilizer consumption in the United States represents from 33-33% of the world total of plant foods used.

In the agricultural year of 1950-51, world consumption exceeded by 50% the amount of commercial fertilizers used in 1938.

U. S. consumption for the 1950-51 period, as compared to 1938, was 176% higher for phosphates; 234% for nitrates and 260% for potash.



Just this much aldrin

(dust or spray)

controls insects on a WHOLE ACRE of cotton!

Aldrin's power to kill cotton insects is so great that you need only 4 ounces per acre for control. That's why aldrin is approved and recommended in every cotton state . . . and why aldrin is far and away your best buy for profitable control.

Use the best . . . it costs you less

No other cotton insecticide has aldrin's killing power in such small doses . . . *at so low a cost per acre!* Now's the time to get your aldrin . . . be ready for the first insect visit!

aldrin

SHELL CHEMICAL CORPORATION

Aldrin is manufactured by Julius Hyman & Co., and is distributed by Shell Chemical Corporation, 500 Fifth Avenue, New York 18.

Aldrin is available under the brand names of leading insecticide manufacturers. Consult your local dealer and county agent.

Southern Ag. Meetings Set for February

PROGRAM plans were complete and sessions were scheduled to begin for the fifth annual meeting of the Southern Weed Conference, as this issue went to press. The meeting was to begin February 6 and continue through the 8th, at the Biltmore hotel, Atlanta, Ga.

COTTON STATES AAEE MEETS

The Cotton States Branch, A.A.E.E., was scheduled to hold its annual meeting February 4 & 5 in connection with the meeting of the Association of Southern Agricultural Workers, just preceding the weed meeting. The A.A.E.E. meeting, as well as the A.S.A.W. convention, was to have its headquarters at the Biltmore.

The program was to include papers on insecticides for control of pests on cotton, livestock, fruit and forests. Talks were to be given by Dr. E. H. Knipling, USDA, Washington, president, American Association of Economic Entomologists, and officers of the Branch: Charles H. Alden, Atlanta, president; Kirby L. Cockerham, Baton Rouge, La., vice-president and L. C. Murphree, State College, Miss., secretary-treasurer. A detailed report of the meetings will appear in next month's issue.

S. W. C. president, G. M. Shear, Virginia Agricultural Experiment Station was to be chairman.

The meeting was to begin Feb. 7 on which seven papers were to be presented. These included "Comparative Efficiency of Certain Herbicides in 1951," by E. R. Stamper and L. E. Creasy, Louisiana Agri. Exp. Station, Baton Rouge; "Some Herbicidal Properties of C. M. U." by L. E. Cowart, E. I. duPont de Nemours & Co., Baton Rouge, La.; "Phthalamic Acid Derivatives for Pre-emergence Weed Control" by A. W. Feldman and A. E. Smith, Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn. and "The Herbicidal Effectiveness and Persistence in the Soil of Several Chemicals When Applied as Preplanting, Pre-emergence and Post-emergence Sprays," by W. C. Shaw, J. P. Trimble and C. R. Swanson, U.S.D.A., Beltsville, Md.

Thursday afternoon's session was to cover weed control in cotton, with W. B. Ennis, Jr., Mississippi Agri. Experiment Station, as chairman. Papers scheduled for presentation at this session included "The Development of Specialized Equipment for Use in a Chemical Weed Control Program in Cotton," by L. E. Creasy, J. L. Smilie and R. Y. Ratcliff, Louisiana Agri. Exper. Station; "Pre-emergence Screening of Chemicals for Weed Control in Cotton," by John T. Holstun, Jr., U.S.D.A., Stoneville, Miss.; "Isopropyl N-3-Chlorophenyl Carbamate as a Pre-emergence Herbicide for Weed Control in Cotton," by O. A. Leonard, V. C. Harris and W. B. Ennis, Jr., Mississippi Agri. Exper. Station; and "Pre and Post-emergence Studies for Chemical Weed Control in Cotton," by W. C. Normand, R. Y. Ratcliff and L. E. Creasy, La. Agri. Exp. Station.

Recommendations for Weed Control in cotton for 1952 were to complete the program for Thursday afternoon. These recommendations were to be presented by F. E. Edwards, V. C. Harris and W. B. Ennis, Starkville, Miss.; and J. T. Holstun, Jr., O. B. Wooten, Jr., Stoneville, Miss.

Weed control in agronomic crops was to be discussed on Friday morning, with Vernon C. Harris, Mississippi Agri. Exp. Station as chairman. Nine technical papers were scheduled for presentation at this meeting. Among these were "Effect of Chemicals on Johnson Grass Rhizomes" by W. S. Hardcastle and Ernest R. Stamper, Louisiana Agri. Exp. Station; "Wild Garlic Controlled in Oats by High Nitrogen Fertilization Plus the Use of 2,4-D," by Glenn C. Klingman, N. Carolina State College, Raleigh; and "Pre-emergence Weed Control in Corn," by W. O. Collins, Univ. of Georgia, Athens, Ga.

L. E. Chaiken, Central Coastal Plain Research Center, was to be chairman of the session of Friday afternoon. Of ten papers to be presented here, the following were included: "Blanket vs. Selective Spraying for Brush Control on Rights-of-Way," by Frank E. Egler, American Museum of Natural History, New York; "Weed Problems in the Indus-

trial Field," by E. F. Cottier, Pacific Coast Borax Co., Auburn, Ala.; and "Weed and Brush Control in Industrial Areas," by Mark B. Weed, E. I. duPont de Nemours & Co., Wilmington, Del.

The final program, Friday afternoon, under the chairmanship of W. C. Shaw, U.S.D.A., Washington, D. C., was to cover horticultural crops and special weed problems.

Officers of the Southern Weed Conference for 1951 were: G. M. Shear, Virginia Agri. Exper. Station, president; J. J. Loustalot, Federal Exper. Station, Mayaguez, Puerto Rico, vice-president; and G. C. Klingman, N. Carolina State College, Raleigh, secretary-treasurer. The group was to hold an election at its Atlanta meeting.

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Returns to Fulton at N. O.

Fulton Bag and Cotton Mills have announced the return of Otis G. West to New Orleans after an absence of over two years.

Mr. West joined the Fulton Organization in Atlanta in 1917. After serving the Company in Atlanta, he was transferred in 1929 to New Orleans where he spent approximately twenty years in the Sales Department. During most of this period he was in charge of the Used Bag and Bagging Divisions.

He was transferred to Fulton Bag's Los Angeles Branch in 1949 and while on the Coast suffered a protracted period of illness from which he is now fully recovered.

•

Weed Meeting on at Reno

Scheduled to be held at the Mapes Hotel, Reno, Nevada, February 5-7, the thirteenth meeting of the Western Weed Control Conference was to open with a session reporting research projects, under the chairmanship of F.L. Timmons, USDA, Logan, Utah. Appearing on this program, according to advance announcements, were A. S. Crafts, California Agricultural Experiment Station, Davis; L. W. Rasmussen, Pullman, Washington; J. M. Hodgson, U. S. Dept. of Agriculture, Meridian, Idaho; R. L. Warden, Bozeman, Montana; C. I. Seely, Moscow, Idaho; Virgil H. Freed, Corvallis, Oregon; and W. Dean Boyle, Bureau of Reclamation, Proser, Washington.

Dr. Crafts was to talk on "Relation of pH to the Penetration and Translocation of 2,4-D in Plants"; and Dr. Freed, "IPC and 3-Chloro IPC, Their Use as Herbicides."

The program of the following day, February, was to have as chairman, B. J. Thornton, Ft. Collins, Colorado. Among the speakers for this session were J. K. Holloway, Albany, Calif.; H. R. Offord, USDA, Berkeley, Calif.; H. R. Hosticka and W. T. Moran, Bur. of Reclamation, Denver, Colo. and E. T. Osborn, USDA, Denver. W. J. Hanson, Dow Chemical Co., Seal Beach, Calif., was to talk on chemical formulations.

The final day's program was to include talks by L. M. Stahler, USDA, Columbia, Mo.; Allen B. Lemmon, chief, Bur. of Chemistry, State Dept. of Agriculture, Sacramento, Calif.; W. L. Klatt, Pacific Coast Borax Co., Los Angeles; and C. E. Fisher, agronomist, Texas Experiment station, Spur, Tex.

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Drake to OPS Job

William P. Drake, vice-president of the Pennsylvania Salt Manufacturing Co., Philadelphia, has been named Director of the Rubber, Chemicals and Drugs Division of the Office of Price Stabilization, OPS Director Michael V. DiSalle has announced.

The new director succeeds Thomas H. McCormack, who is returning to his duties as director of sales of the Grasselli Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington, Del.

Mr. Drake will serve as director until next July 1, Mr. DiSalle said. He joined the company in 1934 in its student training course. Then successively, he was a salesman, a manager of sales, and assistant vice-president in charge of sales, before his appointment as vice-president in 1949.

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FAIR WARNING

to spray equipment manufacturers

In addition to orders already booked for 1952 delivery, we will endeavor to produce for manufacturers of spraying equipment the quantities of pumps shown below, which includes both our standard Series "52" and new International Series I with carbon bearings.

As orders are received, the quantities available of each pump shown here will be reduced accordingly. The monthly production quota detailed below will be insufficient to meet the demand for Oberdorfer spraying pumps during the first half of 1952. Over 50% of our previously unscheduled available production was scheduled in December. If you expect to be shipped any Oberdorfer spraying pumps, be certain to place your order immediately.

SPRING 1952 SPRAYING PUMP PRODUCTION

Pump No.	Pipe Size	Feb.	March	April	May	June
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3AX or 3ZX	⅜"	400	350	400	250	250
4AX or 4ZX	½"	1100	1400	700	700	900
7AX or 7ZX	¾"	750	1200	1100	450	500
9AX or 9ZX	1"	900	1000	800	700	450
2000	⅜"	200	150	250	100	125
3000	½"	250	250	0	50	100
4000	½"	400	300	100	0	200
7000	¾"	700	800	400	0	100
9000	1"	900	400	250	0	450

Pump No.	*Price*	*Pump No.*	*Price*	*Pump No.*	*Price*
2AX —	$13.25	4ZX —	$22.00	2000 —	$15.75
2ZX —	17.50	7AX —	22.50	3000 —	20.00
3AX —	15.50	7ZX —	27.75	4000 —	22.25
3ZX —	20.50	9AX —	23.75	7000 —	28.50
4AX —	17.00	9ZX —	29.00	9000 —	29.75

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OBERDORFER

BRONZE SPRAYING PUMPS

Ia. Fertilizer Meet Held

The fifth annual Fertilizer Manufacturers' Conference was held at Iowa State College, Ames, Ia., January 18, with a program of reports and technical papers as well as a panel on "Needs vs Use of Fertilizers."

H. B. Cheney presided at the opening program, with J. T. Pesek reporting on recent results on sources of phosphorus and H. R. Meldrum on "Top Dressing Established Meadows."

The afternoon session was under the chairmanship of Dr. W.H. Pierre. J. W. Fitts and G. Stanford, Iowa State College, talked on "Potential Fertilizer Needs Based on Soil Tests and Fertilizer Experiments," and a panel discussed the use of fertilizer materials in comparison to the need for plant food.

Final event of the day was a demonstration of a process for curing superphosphate, by Dr. G. L. Bridger, of the Department of Chemical Engineering, Iowa State College.

•

Treemen Honor Horsfall

Dr. James G. Horsfall, director, Connecticut Agricultural Experiment Station, New Haven, was honored on January 23 by receiving the award of merit presented by the Connecticut Tree Protective Association. The award is given each year to the man who makes "outstanding contributions to shade tree appreciation, protection and conservation in Connecticut."

BULLETINS

(Continued rom Page 73)

for use in chemical plants. Write for your copy of the booklet to Pulverizing Machinery Co., 39 Chatham Rd., Summit, New Jersey.

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Emulsol Corp. Bulletin

The Emulsol Corporation, 59 East Madison Street, Chicago, Illinois, has announced the release of their new "Agricultural Chemical Formulators Manual of Pesticide Concentrates", *Technical Bulletin* #31, which presents up to date compilation of data related to the practical requirements in the insecticide and herbicide fields. This Bulletin, superceding an earlier series, is available upon request.

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New Tob. By-Products Plant

Tobacco By-Products & Chemical Corporation has announced that its new insecticide manufacturing plant at East Waco, Texas, was to open on Wednesday, January 30. The opening was to be a gala event, with guests being invited to a luncheon in addition to an inspection tour of the new installation. George F. Leonard, Richmond, Va., former president of the National Agricultural Chemicals Association, is executive vice-president of Tobacco By-Products & Chemical Corp.

•

Sugar Beet Group Meets

The seventh general meeting of the American Society of Sugar Beet Technologists was to be held February 5-8, 1952 in the Hotel Utah, Salt Lake City, Utah. Included on the program are papers

on general agronomy, entomology, plant pathology, agricultural engineering and chemistry.

HERBICIDE HAZARDS

(*Continued from Page 45*)

ity by ingestion and by inhalation, (12) and are not significantly irritating to the eyes or skin. Although it has been suggested that I. P. C. may be carcinogenic, studies conducted at the National Cancer Institute have failed to substantiate this hypothesis (12).

Methyl Bromide

THE health hazards associated with the use of methyl bromide as a seed bed fumigant for killing weed seeds are those of inhalation of vapor and direct contact of the liquid upon the skin.

Since methyl bromide is a highly toxic, odorless gas (13), the hazard from inhalation is serious. The inhalation of high concentrations for short periods of time may lead to acute systemic poisoning and even death; the inhalation of lower concentrations repeatedly and for prolonged periods of time may lead to chronic poisoning from which recovery may be slow but complete.

In order to reduce the hazard of inhalation, methyl bromide is now marketed to a large extent for agricultural purposes with chloropicrin added. Chloropicrin is a very strong lachrymator and a small percent of it in methyl bromide serves as a warning agent, thus markedly reducing the possibility that a person will unknowingly expose himself to hazardous amounts of the vapors.

The use of methyl bromide as an herbicide involves mostly outdoor applications. Under such conditions the likelihood of the operator exposing himself to hazardous concentrations of gas is remote, providing he stays on the windward side of the gas. This practice should also be followed in removing tarpaulins and other equipment from fumigated beds.

When methyl bromide is used indoors, the hazards are increased markedly. If good ventilation is lack-

ing, the precautions necessary to insure safety will approach those required for space fumigation.

In case of spills in confined spaces, persons present should vacate immediately and should not reenter until aeration has been accomplished. If it is necessary to enter a significantly contaminated area, a gas mask should be worn.

It should be noted that the lachrymatory effect of chloropicrin disappears a few hours after discharge over soil and will not keep children or animals from crawling under gas retaining covers. Care should be taken to keep children or animals away from treated plots during fumigation and perhaps for 30 minutes after tarpaulins have been removed. It is recommended that workmen also practice such precautions.

There is little likelihood of local skin injury in using methyl bromide except from spilling or discharging the material directly upon the shoes or clothing. Even should this occur, the prompt removal of contaminated clothing will prevent significant injury. Repeated or prolonged contact is likely to result in irritation and blistering. Contaminated clothing, particularly leather shoes, should not be re-used until completely free of the material.

It can be noted from the preceding discussions of the various herbicides used widely today that information of a more specific nature is available upon the newer products than is available, even now, on some of the older products. The reason for this is that information regarding the health hazards of the older herbicides has been derived largely from experience, some of which has been sad. Information regarding the newer products has been and is being derived largely from studies on laboratory animals together with observations made during the field testing of such products.

The practice in industry today is to study the toxicological properties of new products before marketing, yes, even before samples are sent out, so that hazards can be defined and so that precautions necessary to insure safe handling can be given.

Informative precautionary labeling such as appears on essentially every agricultural product and other chemicals marketed today is an example of this practice. It takes directly to the consumer the following information:

A. Name of product.
B. Signal word designating the degree of hazard: *Danger! Warning!* or *Caution!*
C. Affirmative statements of the particular hazards of that product in the order of their importance.
D. Precautionary measures covering actions to be taken or avoided.
E. Instructions as to what to do in case of contact or exposure.

If every consumer would read the labels on the products he buys today and would follow the directions given thereon, it is exceedingly doubtful that a single case of ill effects would result from the handling and use of

herbicides or other agricultural chemicals.★★

(1) Weed Control: Sodium Chlorate as an Herbicidal Agent in Pastures. F. E. Hance. Hawaiian Planters' Journal. Vol. 48, pg. 233-235 (1944).

(2) Sodium Chlorate Poisoning in Cattle. G. R. Moore. Journal of American Veterinary Medicine Association Vol. 99, pg. 50-52 (1941).

(3) Studies on the Physiological Effects of Sulfamatic Acid and Ammonium Sulfamate, Anthony M. Ambrose; Journal of Industrial Hygiene and Toxicology Vol. 25, pg. 26-28 (1943).

(4) Toxic Effects Following the Cutaneous Administration of Sodium Pentachlorophenate. L. J. Boyd, T. H. McGavack, R. Terranova and F. V. Piccione. New York Medical College and Flower Hospital Bulletin 3, pg. 323-9 (1940).

(5) Acute and Chronic Effects of Pentachlorophenol and Sodium Pentachlorophenate upon Experimental Animals. Wilhelm Deichmann, Willard Machle, Karl V. Kitzmiller, and Girard Thomas. Journal of Pharmacology and Experimental Therapeutics Vol. 76, pg. 104-17 (1942).

(6) Unpublished data of The Dow Chemical Company.

(7) Some Effects of Herbicides on Pasture and on Grazing Livestock. B. H. Grigsby and E. D. Farwell, Michigan Agricultural Experiment Station Quarterly Bulletin. Vol. 32, pg. 378-385 (1950).

(8) Toxicological Studies on Laboratory Animals of Certain Alkyldinitrophenols used in Agriculture. H. C. Spencer, V. K. Rowe, E. M. Adams, and D. D. Irish. The Journal of Industrial Hygiene and Toxicology Vol. 30, pg. 10-25 (1948).

(9) Toxicity of 2,4-dichlorophenoxyacetic Acid for Experimental Animals. Edwin V. Hill and Harold Carlisle. Journal of Industrial Hygiene and Toxicology Vol. 29, pg. 85 (1947).

(10) Tolerance of Farm Animals to Feed Containing 2,4-Dichlorophenoxy Acetic Acid. J. W. Mitchell, R. E. Hodgson and C. F. Gaetjens (U. S. Dept. of Agr., Washington, D. C.) Journal of Animal Science, Vol. 5, pg. 226-32 (1946).

(11) Effects of 2,4-Dichlorophenoxy Acetic Acid on Experimental Animals. Nancy L. R. Bucher. Proceedings of the Society for Experimental Biology and Medicine Vol. 63, pg. 204-5 (1946).

(12) Personal Communication. E. D. Witman. Columbia Southern Chemicals Corporation.

(13) The Response Attending Exposure of Laboratory Animals to Vapors of Methyl Bromide. D. D. Irish, E. M. Adams, H. C. Spencer, and V. K. Rowe. The Journal of Industrial Hygiene and Toxicology Vol. 22, pg. 218-230 (1940).

TECHNICAL BRIEFS

(Continued from Page 77)

Early Yellow Crookneck squash and reduced the yield.

Chemical analysis of the edible portions of the crops indicated that there was no absorption or translocation of DDT by the vegetables under conditions of these experiments.

—USDA Technical Bulletin No. 1034, "Effect on Truck Crops of DDT Applied to the Foliage."

LIABILITY

(Continued from Page 37)

of contamination. If there are attendant dangers to the product, these must be brought to the attention of the public by appropriate warnings and directions for use on the labeling. If the manufacturer undertakes to package his product, he must exercise due care in packing the contents in the container in a manner which is not likely to cause an ex-

plosion when the container is opened or unpacked. The use of defective containers must be avoided.

But regardless of how carefully a product is produced and marketed, it is still capable of being misused. The varying extent to which this may reflect back upon and affect the liability of the manufacturer is seen in the *Tayor* and *Walton* cases.

Under the *Walton* case a sharp line of delineation is drawn between the negligence of the manufacturer and that of the applicator. The same applies to the legal consequences of that negligence. If damage results solely from misuse, the manufacturer is not responsible—the risk shifts to the careless user.

However, under the rationale of the *Taylor* case no such line of demarcation is applicable. Under the theory of strict liability inherent in that decision, the manufacturer, in effect, is made the insurer of the safe use of his product.[13]

In conclusion, the *Walton* decision demonstrates the vulnerability of the generalizations and the ambiguities in *Chapman Chemical Co. v Taylor*—which could potentially constitute a convenient tool for holding the manufacturer responsible regardless of fault. To the lawyer it is familiar that each extension or suggested extension of liability in a particular case is useful to rationalize the next. Although the *Walton* case has not directly overruled *Taylor*, it has imposed strict limitations upon its applicability in future cases. In view of the boundaries marked for it by *Walton*, it is questionable whether *Taylor* has any contemporary vitality as a practical matter.

Strict liability is but a product of the spirit of paternalism which shifts the hazards and economic losses encountered in day to day living from the individual to those presumed to be more sturdy and financially able. Of such a philosophy, one eminent legal scholar has aptly commented:

> "There ought to be a better method of making the legal order effective to our humanitarian ideals than that of Robin Hood or that of the pickpocket who went to the charity sermon and was so moved by the preacher's eloquence that he picked the pockets of everyone in reach and put the contents in the plate."[14]★★

13. The inequity of this rule is particularly pronounced in the case of aerially-applied pesticides where litigation involves third parties who have had no direct relationships with the manufacturer. Here misuse would not raise the defense of contributory negligence theoretically available where the party-plaintiff is the user of the product.

14. Pound, "Newer Ideas of Liability," 123 N.Y.L.J. 524 (1950).

CONDITIONERS

(Continued from page 39)

Conditioners' Use Rate

FIGURE 4 shows the conditioning effect obtained by increasing the proportion of various conditioning agents to the standard 10-10-10 mixture. The addition of sand to the mixture produced no conditioning effect but, with the other materials, the crushing strength of the fertilizer cake was reduced with increasing amounts of conditioner up to 400 pounds per ton of conditioned mix-

ture. Of the 7 materials tested, diatomaceous earth gave best conditioning effect. At the rate of 300 pounds per ton of conditioned mixture, the crushing strength of the fertilizer cake was 27 p.s.i., a reduction in crushing strength of 89%. At the rate of 400 pounds per ton, the cake was too fragile to obtain an accurate measurement. The reduction in crushing strength is estimated at 97%.

In general, it appears that low apparent density of the conditioning agent enhances its conditioning effect. The apparent densities of the conditioning agents indicated in Figure 4 are: sand 86, phosphate rock dust 77, kaolinitic clay 28, rice hull meal 22, cocoa shell meal 25, bark dust 18, and diatomaceous earth 13 pounds per cubic foot.

Effect of Magnesium Oxide

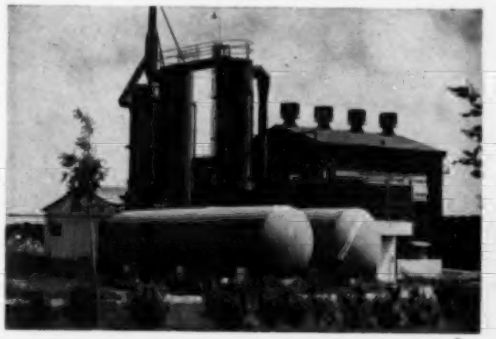
MAGNESIUM oxide (calcined magnesite) was incorporated in amounts ranging from 0 to 30 pounds per ton in four different mixtures having plant-nutrient ratios of 1-1-1, 1-2-1, 1-2-2, and 1-4-4. The particle size of the ingredients (50-60 mesh) was the same in each mixture and the initial moisture content was maintained near 5%. Formulas of these mixtures are given in Table III, together with the results of laboratory caking tests and moisture analyses.

The results of this series of tests show that caking was more severe in the 10-10-10 grade, followed in order by 6-12-12, 10-20-10 and 3-12-12. With the exception of the 3-12-12 mixture there was, in general a progressive decrease in both free moisture content and caking tendency with increase in the amount of MgO present. The decrease in free moisture content however, does not account for more than a small fraction of the decrease in caking tendency of these mixtures. One percent of MgO in the 10-10-10 reference mixture gave 74% reduction in crushing strength of cake, and with the exception of expanded perlite, was a more effective anti-caking agent than other materials used at the rate of 5% in the mixture.

Urea

THE solution phase of the average mixed fertilizer contains relatively large amounts of ammonium and chloride ions owing to the presence of ammonium salts and potassium chloride in the mixture. Rader (*13*) showed that ammonium chloride is the first salt to be deposited from the solution phase of a 5-10-4 mixture containing 5.44% ammonium ion equivalent and 4.12% chloride ion. The branching, tree-like growth of crystals of this salt is probably largely responsible for the caking of many fertilizer mixtures as a result either of decreases in free moisture content or in temperature during storage.

The branched structure of ammonium chloride is modified to form cubes when 1 part of urea is present for 6 parts of ammonium chloride (*5*). To determine whether a cluster of cubical crystals would



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produce a weaker binding between particles than the normal branched crystals of ammonium chloride, a series of caking tests were made on the reference mixture with and without the addition of urea. The mixture contained 4.4% initial moisture. The crushing strength of cakes produced with urea used at rates of 0, 20, and 50 pounds per ton of final mixture, were respectively 249 ± 14, 181 ± 4, and 129 ± 5. Thus, 50 pounds (2.5%) of urea produced a 54-percent reduction in crushing strength of cake and was a more effective anti-caking agent than most of the inert conditioning agents used at twice this rate.

(Part II Appears Next Month)

SOIL RESIDUES

(Continued from page 49)

centrations of DDT ranged from 24 pounds per acre for the clay soil, to 27 pounds for the muck soil; and from 23 to 24 pounds when corrections were made from the results of analyses of untreated soils. Similar results have been obtained from analyses of soils containing chlordane.

Fleming *et al.* (3) reported that the concentrations of DDT and chlordane in several soils determined by biological assay and by chemical analysis for organic chlorine were in agreement within about 2 pounds per 3-inch acre. Apparently the presence of soil constituents or of any degradation products was not important. These results suggest that the organic-chlorine method may be adapted to the determination of other chlorinated hydrocarbons in soil. However, it can be useful only for soils containing one chlorinated hydrocarbon. If both DDT and chlordane are present, it may be possible to determine the concentration of the chlordane by the biological assay method and to calculate the concentration of the DDT by difference from an organic-chlorine determination.

The concentration of lead arsenate in soil may be calculated from an arsenic determination as described by Koblitsky (4). This method consists in reduction of the lead arsenate with a hydrazine-sodium bromide solution in the presence of hydrochloric acid, removal by distillation of the arsenious chloride formed, and titration of the distillate for arsenic. Analyses by this method have indicated recoveries of 98 to 101 percent. It has been used for many years for the analysis of soils treated in connection with the Japanese beetle quarantine.

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(6) Pepper, B. B., C. A. Wilson, and J. C. Campbell. Benzene hexachloride and other compounds for control of wireworms infesting potatoes. Jour. Econ. Ent., 40, 727-30 (1947).

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

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Agronomist or technical representative. PhD. Ten years research and teaching experience in forage and grain crops and in soil and plant analysis. Presently employed, desires change of location. Address Box No. 616, c/o **Agricultural Chemicals.**

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Agricultural Ammonia Advocate seeks greener pastures! Just an ordinary, likeable guy with an exceptional sales record and proven managerial ability. Likes the sun so prefers Southwest. Desires position in larger area allowing expansion and income commensurate with ambitious nature. Now employed. Family man. Many years experience with ammonia. Technical and practical background in soils, citrus, vegetables, and field crops. Age 37. Address Box No. 618, c/o **Agricultural Chemicals.**

For Sale

FOR SALE: Pre-season offer. Sixty 55 gallon drums 25% DDT emulsifiable concentrate. 100% Xylene solvent. Dealers only. Sell all or part. Address Box No. 614, c/o **Agricultural Chemicals.**

FOR SALE: 20 tons sulphur flour specially prepared for insecticidal purposes. In original 50-lb. bags. Address Box No. 615, c/o **Agricultural Chemicals.**

Miscellaneous

Sprayer — Will purchase used spray equipment unit suitable for custom orchard work. Complete portable unit truck or tractor drawn, any standard make, good condition. Eastern location. Give age, price, other details. Address Box No. 613, c/o **Agricultural Chemicals.**

Buy-Trade-Sell: Phenol, Napthalene, Para, DDT, BHC, Pyrethrum, Glycols, Cellosolves, Ethanolamines. Other Chemicals, Solvents, etc. Chemical Service Corporation, 86-02 Beaver St., New York 5, N. Y.

Distributorships Available in some areas for Tykor Insecticidal Sano-White, the leading insecticidal white wall coating. Widely accepted by commercial sprayers, farmers and others as best available. Referred to in '52 Spring **Farm Quarterly** article. Write Tykor Productions Division, The Borden Company, 350 Madison Avenue, New York 16.

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ACS Pesticide Div. Meets

The Pesticides Subdivision of the Division of Agricultural and Food Chemistry of the American Chemical Society will sponsor a symposium on "The Significance of Pesticide Residues" at the national spring meetings to be held in Milwaukee, Wisconsin, March 30 to April 3. This symposium will be presented on April 1 and 2 and will be followed by a program of submitted papers of further interest to agricultural chemists and entomologists on April 3, it has been announced. The complete program will be published later.

Krilium Use Clarified

Some confusion has arisen over the function of "Krilium," new agricultural product manufactured by Monsanto Chemical Co., St. Louis. A telegram from Larry Schulenburg, Monsanto, indicates that Krilium is not a fertilizer, but should be considered a supplemental material, to be used to "mutual advantage" with fertilizer.

The text of Mr. Schulenburg's telegram follows:

"Appreciate any emphasis you can make of the fact that Krilium is not a fertilizer. Actually, as Dr. C. A. Hochwalt, vice-president in charge of research and development for Monsanto has stated, current tests may show that Krilium and fertilizer can often be applied in the same operation to mutual advantage.

"Krilium does not provide additional crop or plant nutrients, but permits those nutrients already in soil to become more effective in growth processes. Monsanto at no time has meant to imply that tests thus far indicate the replacement of fertilizer with Krilium."

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Alabama Short Course Set

The third annual short course at Auburn, Alabama, is to be held February 26 & 27, according to G. R. Williamson, Agricultural Sulphur & Chemical Co., Dothan, Ala.

Normally attended by county agents, dealers, distributors, blenders and formulators of agricultural chemicals, as well as custom operators, the meeting is expected to draw a large attendance, Mr. Williamson said.

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Conn. Veg. Growers Meet

Connecticut vegetable growers were to hold their annual midwinter meeting at the Connecticut Agricultural Experiment Station, New Haven, February 7. Roy E. Norcross, New Haven County Agent, in charge of the event, said he expected a crowd of more than 200 to attend.

Irving Christensen, Wilson, Conn., president of the group, was to preside at the meeting and Dr. James G. Horsfall, director of the Experiment Station, was to welcome the Association.

Advertisers' Index

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)

TALE ENDS

A PRODUCT made of sand, cement and water, including "certain organisms," being sold by a New England firm as a sort of agricultural cure-all, failed to pass the critical inspection of the Federal Trade Commission recently. Known as the "Brown-Cell Matrix disc," the material was advertised as being effective as a fertilizer, in purifying water, in eliminating weeds, in making unnecessary the application of insect sprays, and reducing the mortality of young ducks and chickens. The FTC inspector's report said that the product just doesn't do the things its makers claim!

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The Bureau of Reclamation recently used some 43,000 pounds of 5.5% rotenone in Bumping Reservoir, in the Cascade Mountains, to kill off suckers, squawfish and shiners which had driven trout and other favorite sporting fish from the area. The toxicant was "applied" by 27 out-board botor boats, each of which towed a gunny sack filled with rotenone which was forced from the bag by the water's motion. The operation was regarded as highly successful, since the unwanted creatures were found dead by the thousands. The lake was "quarantined" for two months, allowing time for the rotenone to lose its toxicity.

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Occasional complaints from subscribers on the west coast indicate that second class mail fails to deliver the goods in a very rapid manner. We have learned that in some instances, it has taken two weeks for copies of *Agricultural Chemicals* to reach western readers.

This seems slightly out of keeping with 1952 and our boasts of how speedily everything can be done in this modern time. Planes cross the ocean in a matter of a morning or afternoon; fast transportation by rail and air is in service all the way across America 24 hours a day.

Yet, despite all this, second class postal service seems to have bogged down to a point where the famed pony express of pre-Civil War days offered a faster means of mail carrying. Operating from St. Joseph, Mo. to the Pacific, a distance of nearly 2,000 miles, the scheduled time of this galloping enterprise was 10 days. And on one special occasion, when Lincoln's first inaugural was being transported, (this was before either railroads or telegraph lines reached beyond the midwest) the trip was made in 7 days and 17 hours.

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The grapevine has it that a group of Canadians is thinking of forming an association which would be similar to both the National Agricultural Chemicals Association and the Chemical Specialties Manufacturers' Association in the U. S. Representatives of the Canadian Chemical industry were expected to meet with interested parties in the U. S. soon.

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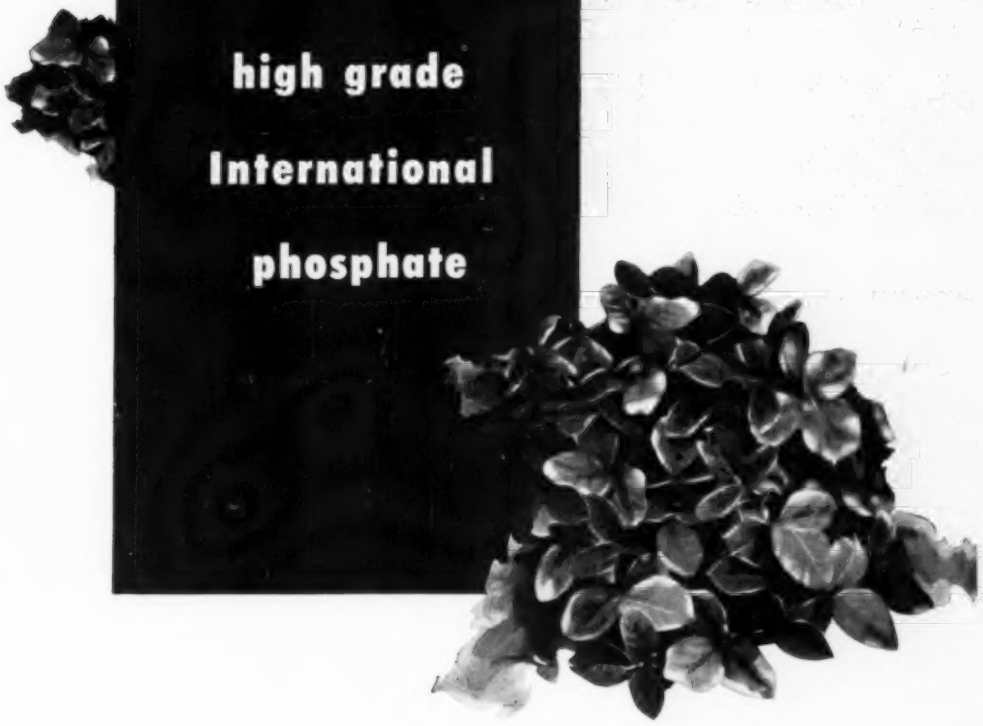

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